Vol. III.

TRANSCRIPT OF RECORD.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, [redacted] 1914

No. [redacted] 67

THE HART STEEL COMPANY AND GUILFORD S. WOOD, PETITIONERS,

vs.

THE RAILROAD SUPPLY COMPANY.

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT.

PETITION FOR CERTIORARI FILED FEBRUARY 20, 1915.
CERTIORARI AND RETURN FILED MARCH 27, 1915.

(24,569)

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(24,569)

PREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1915.

No. 357.

HART STEEL COMPANY AND GUILFORD S. WOOD, PETITIONERS,

vs.

THE RAILROAD SUPPLY COMPANY.

RIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT.

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& DETWEILER (INC.), PRINTERS, WASHINGTON, D. C., NOVEMBER 30, 1915.

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VOL. III.

1490½ In the United States Circuit Court of Appeals for the Seventh Circuit, October Term, A. D. 1911.

No. 1886.

THE RAILROAD SUPPLY COMPANY, Appellant,
vs.
THE HART STEEL COMPANY and GUILFORD S. WOOD, Appellees.

Mr. Taylor E. Brown, Mr. C. C. Linthicum, Mr. Clarence Poole, Counsel for Appellant.
Mr. Frank F. Reed, Mr. Edward S. Rogers, Mr. Frederick P. Fish, Counsel for Appellees.

Appeal from the Circuit Court of the United States for the Northern District of Illinois, Eastern Division.

1491 In the Circuit Court of the United States, Northern District of Illinois, Eastern Division. In Equity.

THE RAILROAD SUPPLY COMPANY, Complainant,
vs.
THE HART STEEL COMPANY and GUILFORD S. WOOD, Defendants.

DEFENDANTS' EXHIBITS.

Frank F. Reed and Frederick P. Fish, Solicitors for Defendants.

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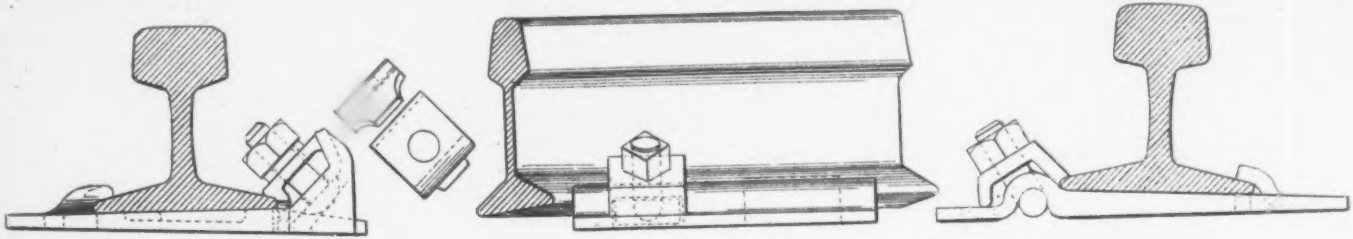
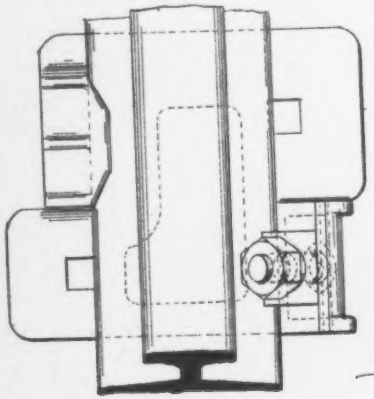
EXHIBIT AA.

KATE S. HOLMES,
Notary Public.

(Here follows drawing marked pages 1495 and 1496.)





Railroad Gazette, Vol. 22,
June 6, 1890, p 399.

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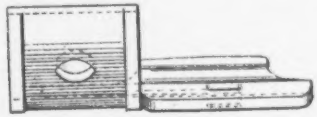
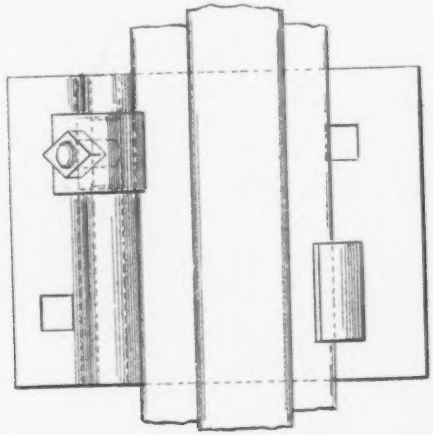




Defendant's Exhibit A.A.

1497 & 1498 DEFENDANTS' EXHIBIT BB.

KATE S. HOLMES,
Notary Public.

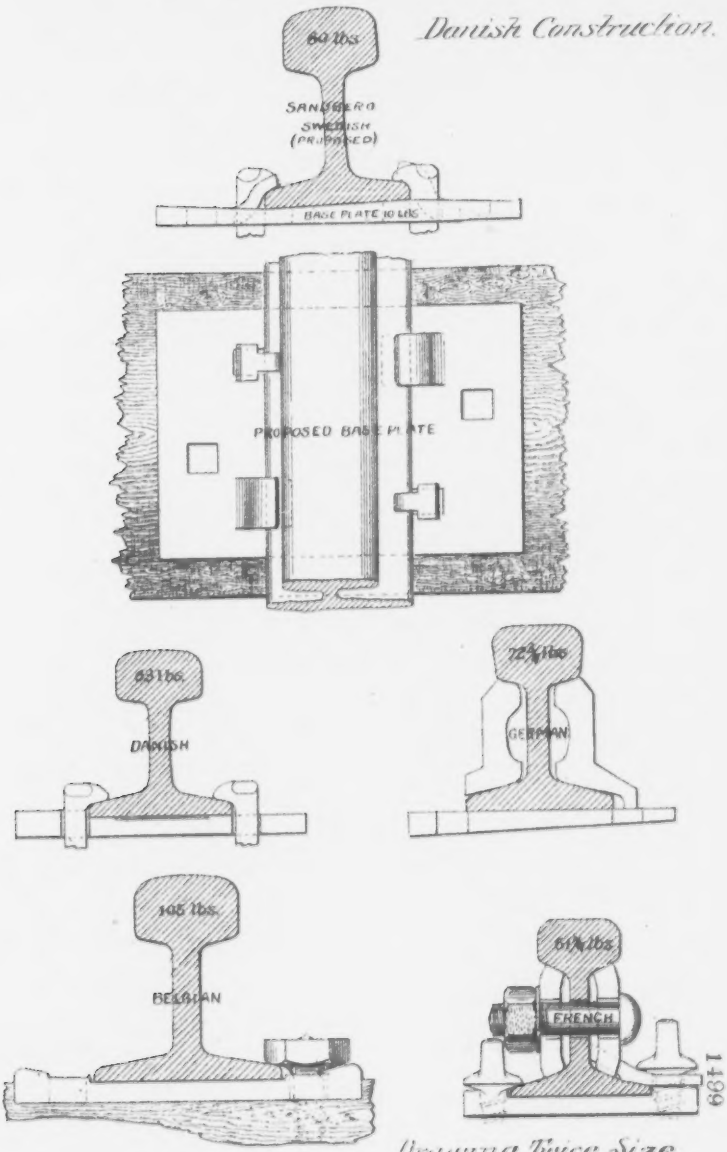
(Here follows drawing marked pages 1499 and 1500.)

THE ECONOMY ROLLED STEEL FOUR FLANGE TIE PLATE

Railroad Gazette, Vol. 24, March 25, 1892, p221.

Defendant's Exhibit B.B.

Danish Construction.



1499

Drawing Twice Size.

1501 & 1502 DEFENDANTS' EXHIBIT CC.

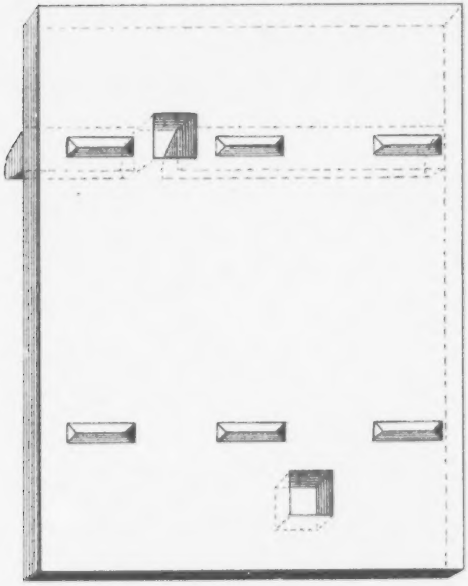
KATE S. HOLMES,
Notary Public.

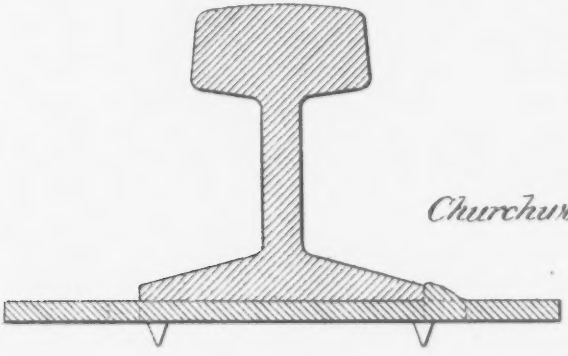
(Here follows drawing marked pages 1503 and 1504.)

ailroad Gazette, Vol. 24, July 8, 1892. p. 507.

Defendant's Exhibit C.C.

Inverted Plan.





Churchward.

1503

A New Tie Plate.

Drawing Twice Size.

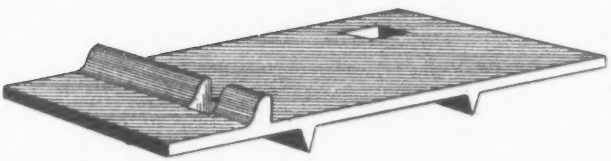
05 & 1506 EXHIBIT DD.

KATE S. HOLMES,
Notary Public.

(Here follows drawing marked pages 1507 and 1508.)

Railroad Gazette, Vol. 24, Nov. 11, 1892, p 839.

Defendant's Exhibit DD.



The Goldie Tie Plate.

1507

Drawing Twice Size.

1509 & 1510 EXHIBIT E. E.

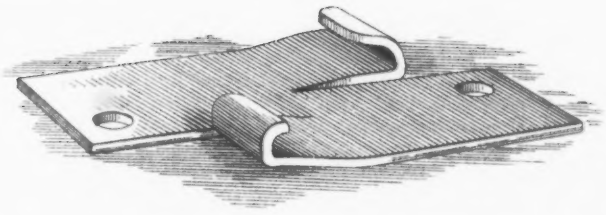
KATE S. HOLMES,
Notary Public.

(Here follows drawing marked pages 1511 and 1512.)

THE ECONOMY ROLLED STEEL FOUR FLANGE TIE PLATE

Railroad Gazette, Vol. 21, March 8, 1889 p 160.

Defendant's Exhibit E.E.



1511

Drawing Twice Size.

THE ECONOMY ROLLED STEEL FOUR FLANGE TIE PLATE

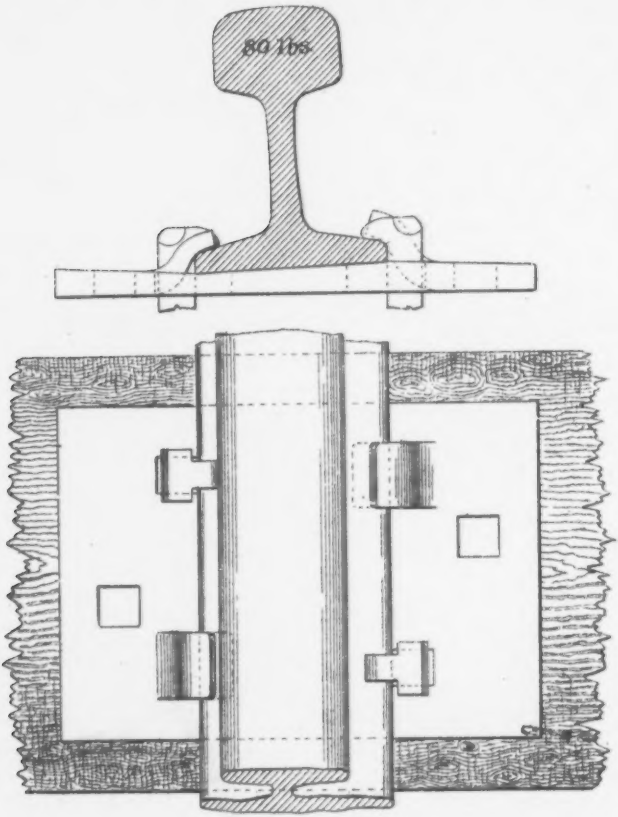
1513 & 1514 EXHIBIT F. F.

KATE S. HOLMES,
Notary Public.

(Here follows drawing marked pages 1515 and 1516.)

Railroad Gazette, Vol. 21, April 5, 1889, p221.

Defendant's Exhibit F. F.



1516

Drawing Twice Size.

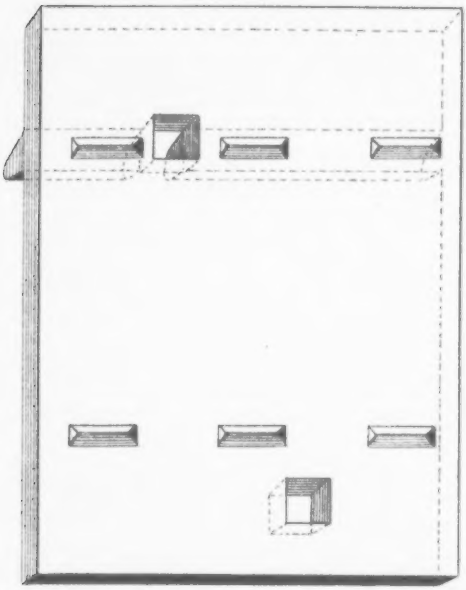
517 & 1518 EXHIBIT G. G.

KATE S. HOLMES,
Notary Public.

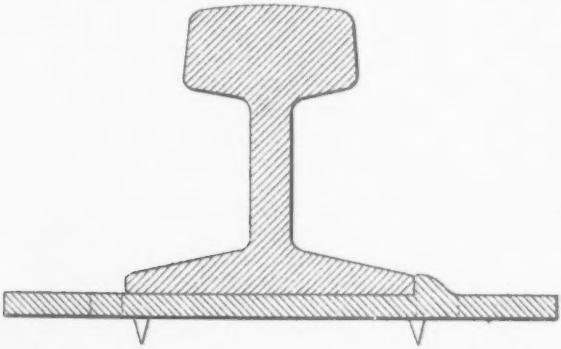
(Here follows drawing marked pages 1519 and 1520.)

The Railway, Slope and Northwestern Railroader.
Vol. 17, Aug. 5, 1892, p 613.

Defendant's Exhibit. G.G.



The Cac Tie Protector Plate, View of Bottom.



The Cac Tie Protector Plate, Sectional View.
Drawing Twice Size.

1519

THE ECONOMY ROLLED STEEL FOUR FLANGE TIE PLATE

1521 & 1522 EXHIBIT D. D. D.

KATE S. HOLMES,
Notary Public.

(Here follows drawing marked pages 1523 and 1524.)

Railroad Gazette, Vol. 19, Sept. 30, 1887, p 630.

Drawing One-Half Size.

1523

Fig. 1.

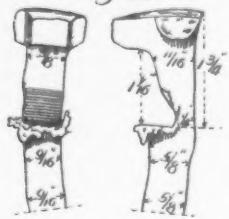


Fig. 2

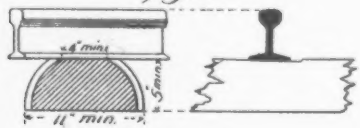


Fig. 3.

Fig. 4.

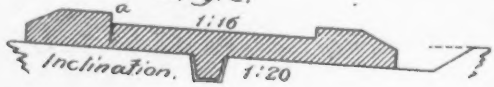


Fig. 5.

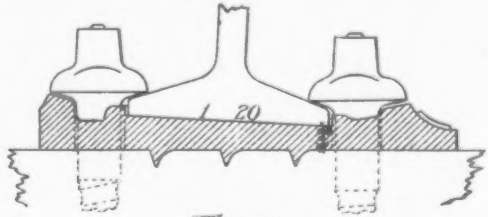


Fig. 6.

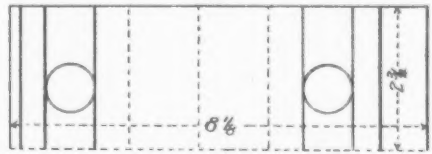
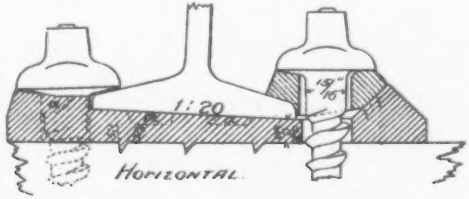


Fig. 8.



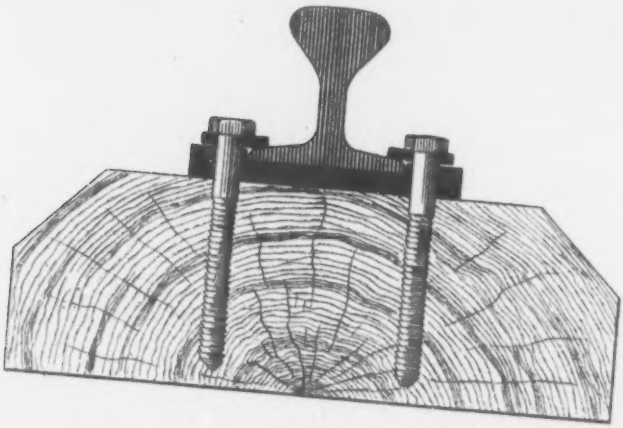
1525 & 1526 EXHIBIT K. K. K.

KATE S. HOLMES,
Notary Public.

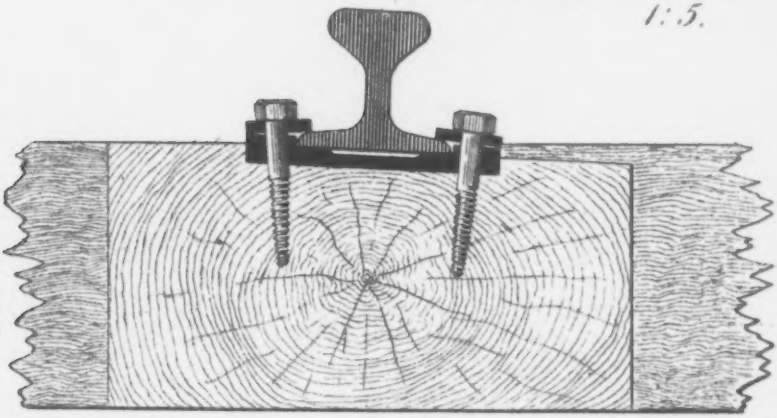
(Here follows drawing marked pages 1527 and 1528.)

Eisenbahn-Geleise 1891.

634



635 Köln Minden (1844)
1:5.



Niederschlesisch-Märkische Bahn
(1846)

Defendant's Exhibit K K K. 1527

Drawing Twice Size

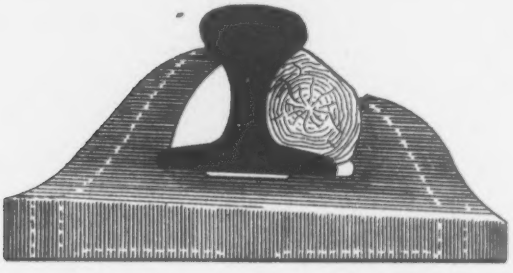
1529 & 1530 EXHIBIT L. L. L.

KATE S. HOLMES,
Notary Public.

(Here follows drawing marked pages 1531 and 1532.)

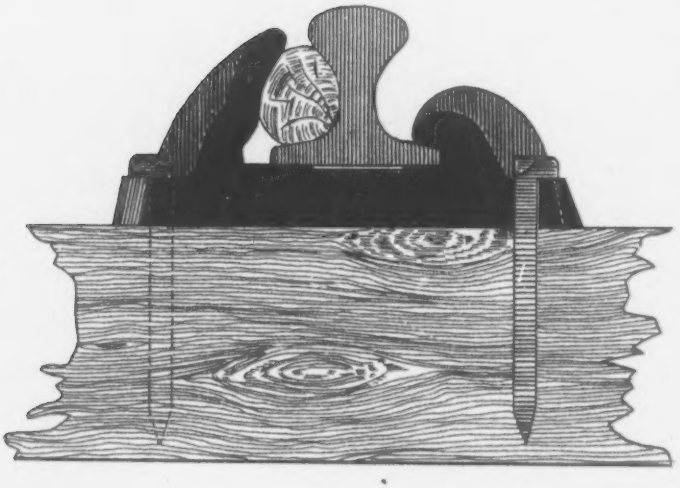
Eisenbahn-Geleise 1891

661



Bonn-Köln (1843)
1:5.

662.



1531

Defendant's Exhibit, I.L.L.

Drawing Turico Size

1533 & 1534 RAILROAD SUPPLY CO.

VS.

HART STEEL CO. & G. S. WOOD.

RAILROAD SUPPLY CO.

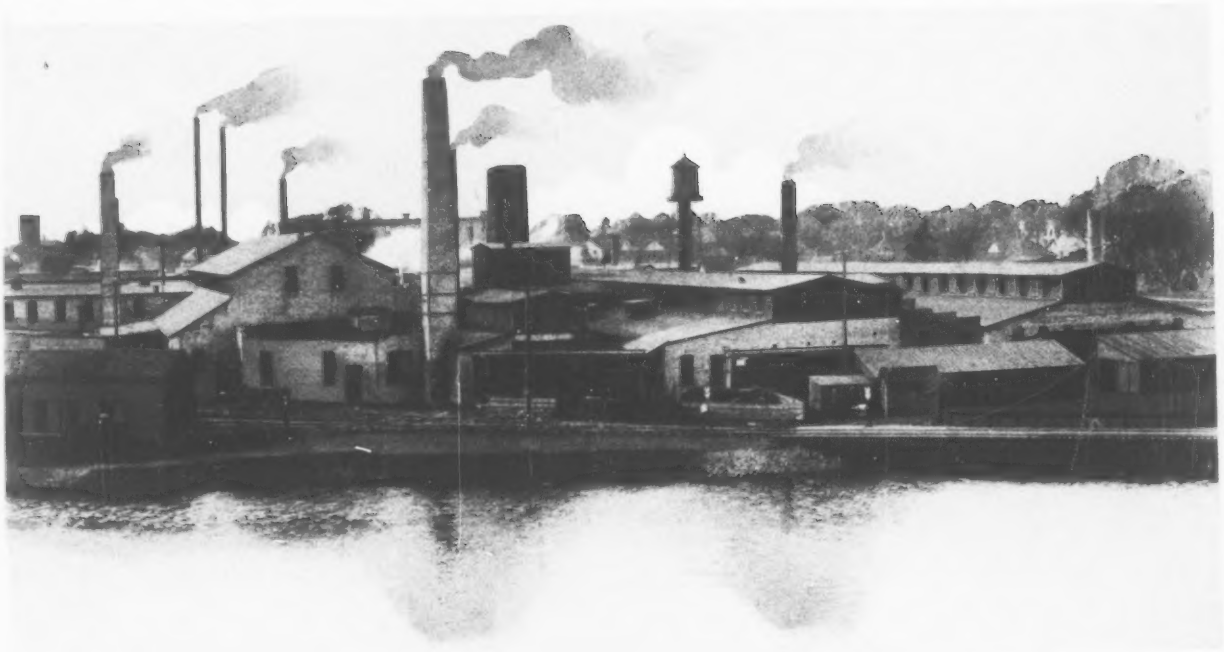
VS.

ELYRIA STEEL & IRON CO.

DEFENDANTS' EXHIBIT T.

KATE S. HOLMES,
Notary Public.

BEAVER DAM



696

TIE PLATES

Beaver Dam Malleable Iron Co.

Beaver Dam, Wis.

LAWRENCE FITCH
Sales Agent
607 Commercial National Bank Building
CHICAGO, ILL.

126

The use of tie plates as an important factor of economical maintenance of way is an established fact.

The purpose of this pamphlet is to call your attention to the growing use of Malleable Iron as the most economical material from which tie plates can be made.

276

A Malleable Iron tie plate, on account of the annealing process through which it has gone, is able to withstand the deteriorating effects of the atmosphere and the brine from the refrigerator cars better than plates made from any other material.

The annealing process transforms the combined carbon into a form of graphite, which prevents excessive rust. Surely an important point where plates are left out in the rain and snow for a long period before application.

826

The cut on the opposite page shows our Beaver Dam Plate.

Note the shoulder and longitudinal flanges, a combination possible only in a Malleable Iron plate.

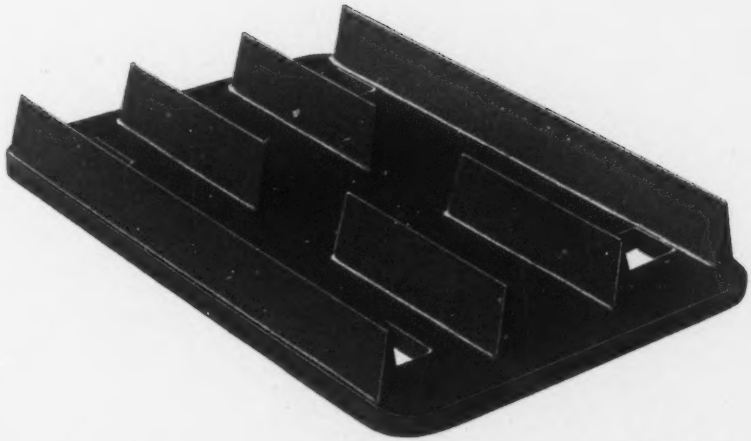
The round corners save weight and reduce cost.

Beaver Dam
Tie Plate

Any Length. Any Width. Any Thickness.

This cut shows bottom view of our Beaver Dam Plate. The two broken flanges give a double end thrust, which is of great assistance in holding the track to gauge. The flanges do not extend to the end of the plate, which prevents water from getting into the tie and rotting it out.

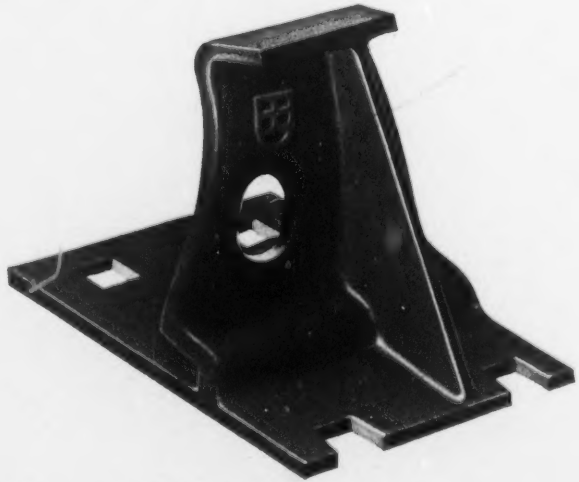
Beaver Dam
Tie Plate



Any Length. Any Width. Any Thickness.

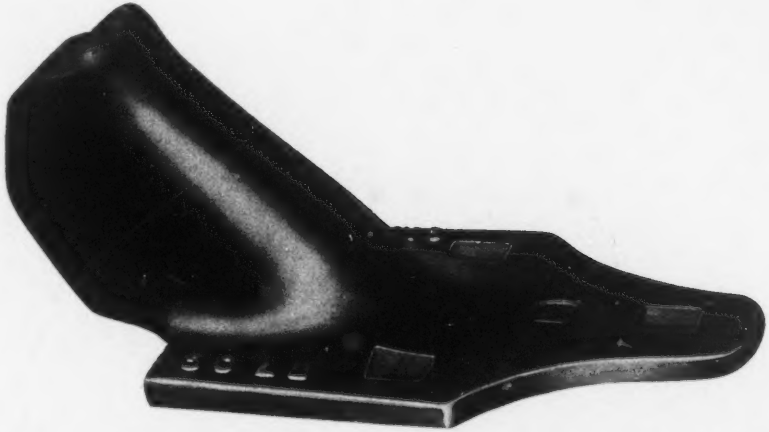
276

Beaver Dam
Combination
Tie Plate
and
Rail Brace



Malleable Iron affords longer life and greater strength than any other material.

Beaver Dam
Standard
Rail Brace



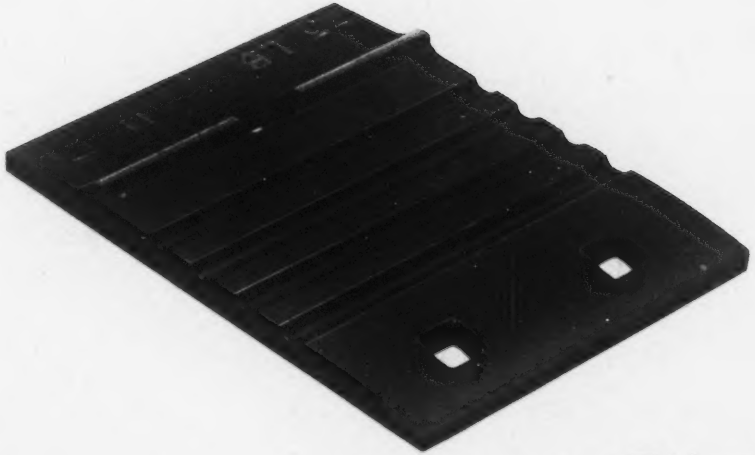
Malleable Iron affords longer life and greater strength than any other material.

626

Beaver Dam
Tie Plates

On this plate we bevel the ends, very materially reducing the weight and cost.

Beaver Dam
Standard
Flat Plate



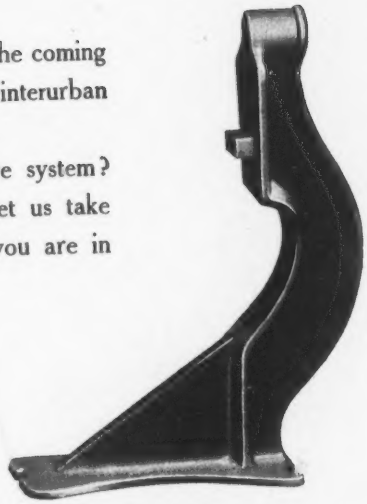
Any Length. Any Width. Any Thickness.

Beaver Dam
Pierce
Tie Plate

On account of the peculiar construction of the flanges this plate will hold tighter to the tie than any plate on the market.

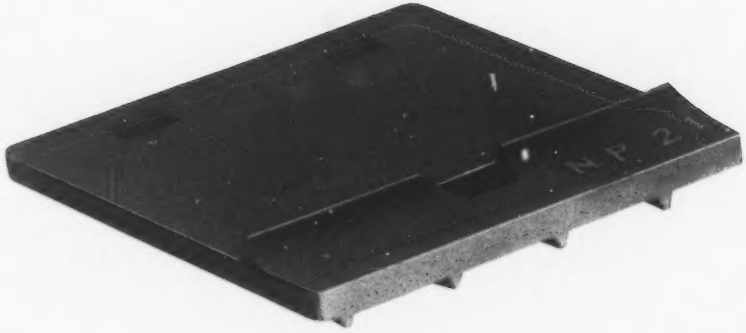
The third rail system of electric transmission is the coming system to be adopted by all electric, elevated and interurban services.

Are you considering the installation of the above system? If you are, use our style of third rail bracket. Let us take this matter up with you more fully. Write us if you are in the market for any of this material.



Third Rail Bracket

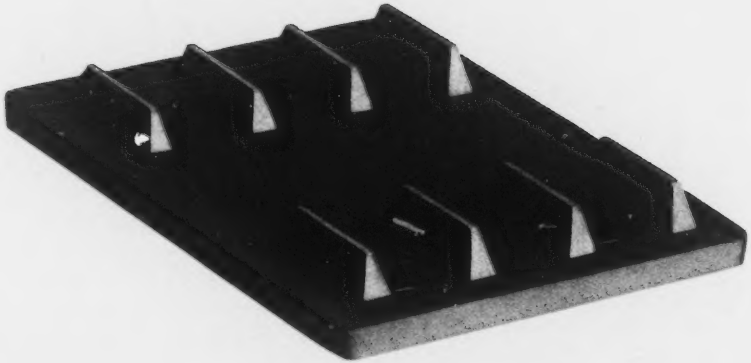
This cut shows an extra heavy plate desired by some for use in Rail Road yards, where traffic is heavy and movements are frequent.



Beaver Dam
Tie Plate

586

Note the flanges on the Bottom of this plate—8 instead of 6 as on the regular plate.



Beaver Dam
Tie Plate

We are prepared to furnish special Tie Plates to meet peculiar conditions.

RAILROAD CASTINGS

Send us your Blue Prints and Specifications.

Beaver Dam Malleable Iron Co.
Beaver Dam, Wis.

LAWRENCE FITCH
Sales Agent
607 Commercial National Bank Building
CHICAGO

1555 & 1556 U. S. Cir. Ct., N. Dist. Ill., Eastern Div.

RAILROAD SUPPLY CO.

vs.

HART STEEL CO. & G. S. WOOD.

U. S. Cir. Ct., N. Dist. Ohio, Eastern Div.

RAILROAD SUPPLY CO.

vs.

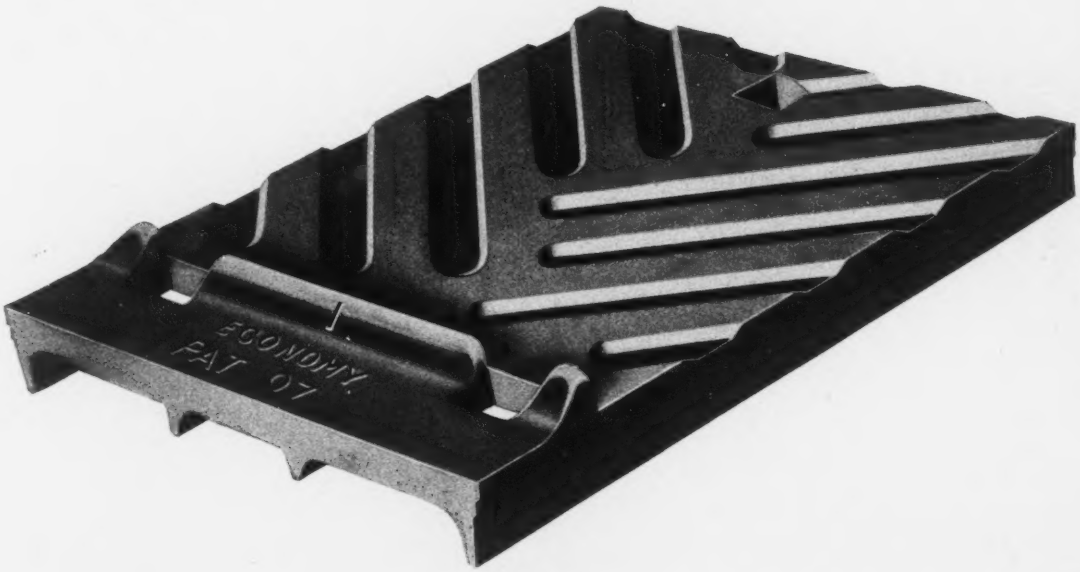
ELYRIA STEEL & IRON CO.

DEFENDANTS' EXHIBIT K. K. K.

KATE S. HOLMES,
Notary Public.

DEFENDANTS' EXHIBIT K. K. K.

ECONOMY TIE PLATES



No. 1

THE ECONOMY ROLLED STEEL FOUR FLANGE TIE PLATE

THE ECONOMY TIE PLATE No. 1 unquestionably combines strength, rigidity and economy, and meets without question the following requirements:

Ease of application to hardwood ties.
Easy readjustment for track alignment.
Increased adhesion to tie.
Maximum strength to prevent buckling.
Reduction in number of spikes used.
Protection from spike wear from traveling rail.
Maintenance of position when once applied.
A single plate suitable for all track requirements.

These plates are rolled 8″, 8½″ and 9″ nominal lengths; 5″ width; and 5/16″, 3/8″ and ½″ thick. Also 8″ and 9″ nominal lengths by 6″ width; 5/16″, 3/8″ and ½″ thick.

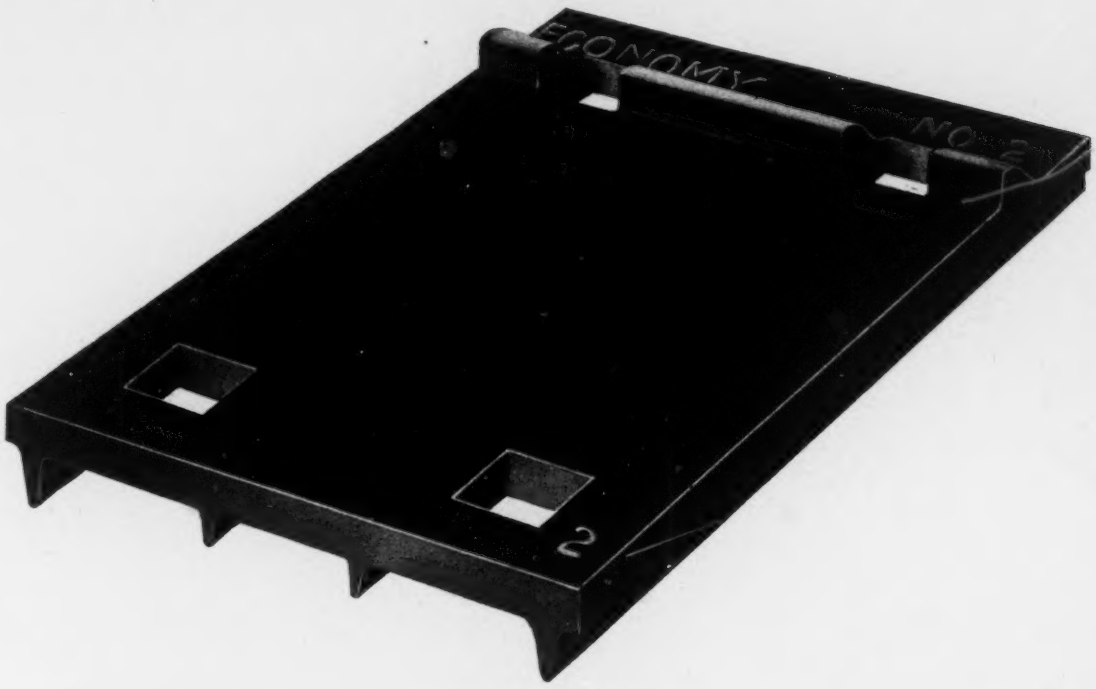
MANUFACTURED AND SOLD BY

SPENCER OTIS COMPANY

CHICAGO OMAHA

NEW YORK

ECONOMY TIE PLATES



Economy No. 2

THE ECONOMY ROLLED STEEL FOUR-FLANGE TIE PLATE

THE ECONOMY TIE PLATE No. 2 unquestionably combines strength rigidity and economy, and meets without question the following requirements:

Ease of application to hardwood ties.
Easy readjustment for track alignment.
Increased adhesion to tie.
Maximum strength to prevent buckling.
Reduction in number of spikes used.
Protection from spike wear from traveling rail.
Maintenance of position when once applied.
A single plate suitable for all track requirements.

These plates are rolled 7¼″, 8″, 8½″ and 9″ nominal lengths; 5″ width; and 5/16″, 3/8″ and ½″ thick. Also 7¼″, 8″, 8½″ and 9″ nominal lengths by 6″ width; 5/16″, 3/8″ and ½″ thick.

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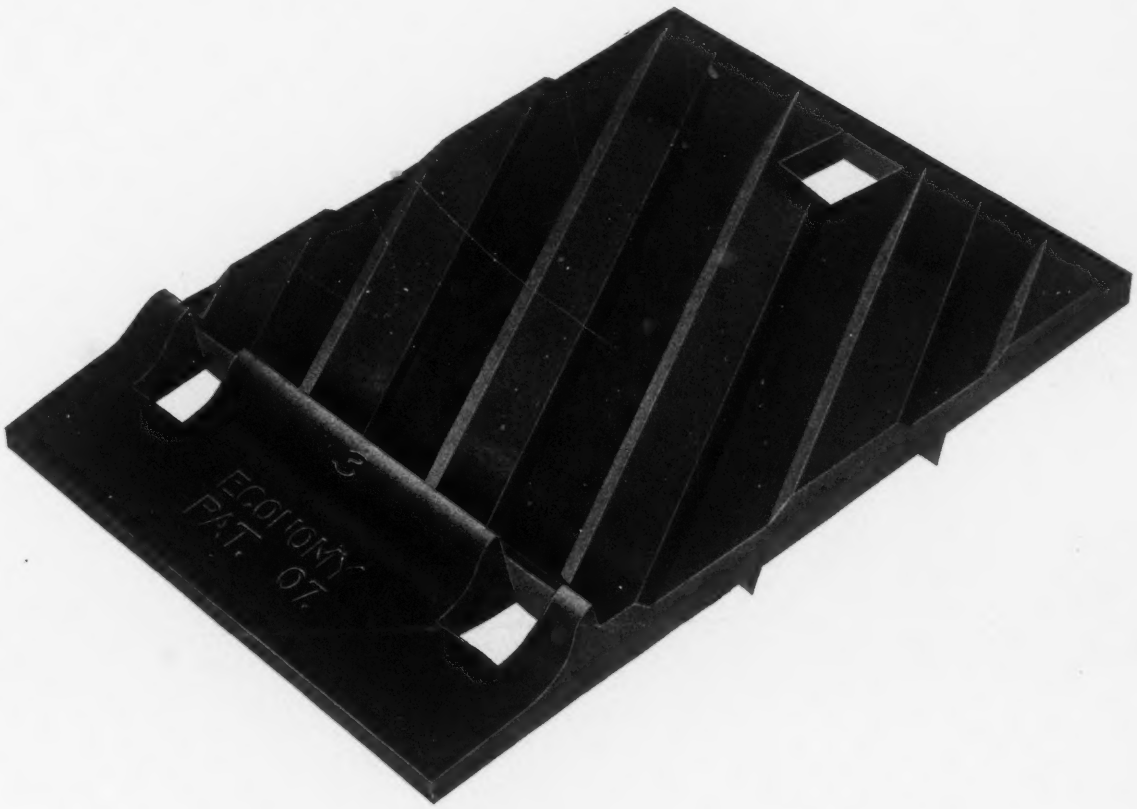
SPENCER OTIS COMPANY

CHICAGO ST. LOUIS

NEW YORK

ECONOMY TIE PLATES



Economy No. 3

THE ECONOMY FLANGED BOTTOM RIBBED TOP SHOULDER PLATE

In designing the above plate we have endeavored to preserve strength and wearing surface and at the same time reduce the weight of the plate to the minimum consistent with safety.

Rolled 8″, 8½″ and 9″ long; 5″, 6″, 7″, 8″ and 8½″ wide; ⅜″, $\frac{7}{16}$″ and ½″ thick.

MANUFACTURED AND SOLD BY

SPENCER OTIS COMPANY

CHICAGO ST. LOUIS

NEW YORK

ECONOMY TIE PLATES

Economy No. 4

THE ECONOMY STANDARD FOUR-FLANGE TIE PLATE

A four-flange plate, new in design, which meets every requirement demanded of tie plates of this character.

Rolled 4¼", 5" and 6" widths; ¼", 5/16", 3/8" and ½" thick.

Sheared and punched to suit rail base.

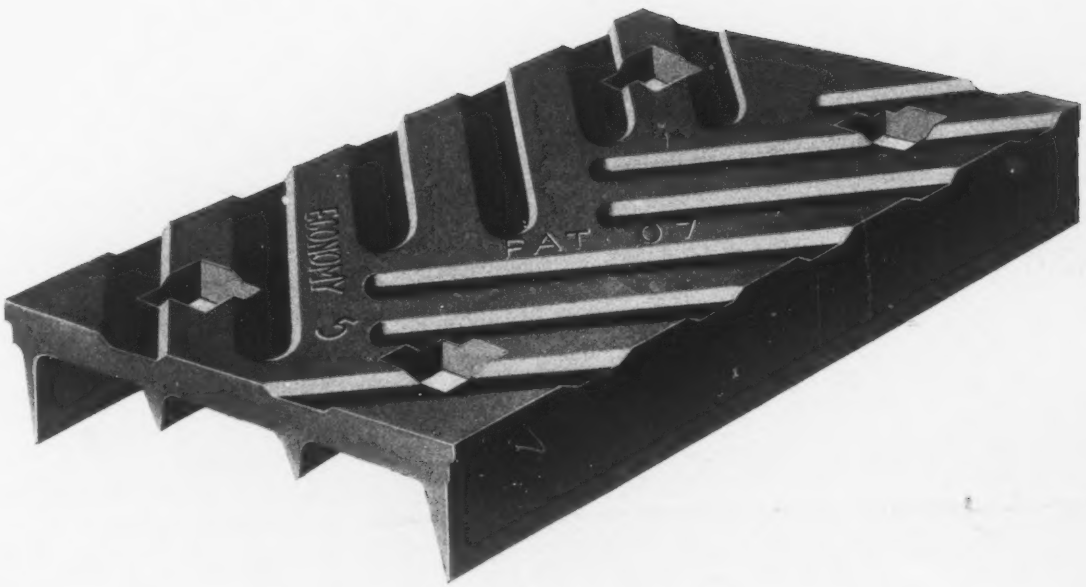
MANUFACTURED AND SOLD BY

SPENCER OTIS COMPANY

CHICAGO ST. LOUIS

NEW YORK

ECONOMY TIE PLATES



No. 5

THE ECONOMY EXTENDED FLANGE TIE PLATE

The above cut illustrates **THE ECONOMY TIE PLATE** with the outside flanges extended or lengthened, while the inside flanges are materially shortened. The top surface has all the features embodied in our **Standard Four-Flange Plate No. 4.**

Rolled 4¼", 5" and 6" widths; ¼", 5/16", 3/8" and ½" thick.

Sheared and punched to suit rail base.

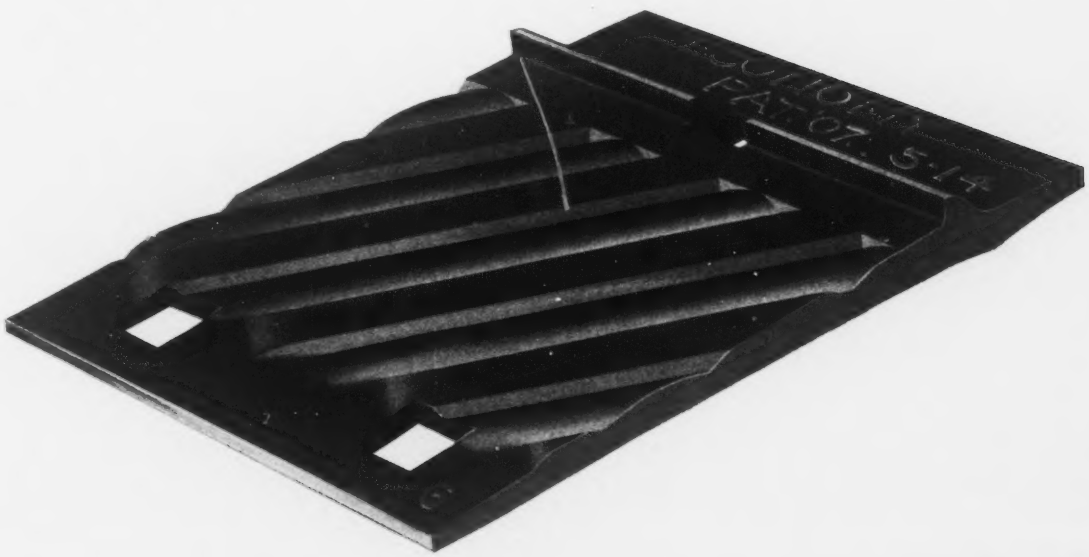
MANUFACTURED AND SOLD BY

SPENCER OTIS COMPANY

CHICAGO OMAHA

NEW YORK

ECONOMY TIE PLATES



Economy No. 6

THE ECONOMY RIBBED TOP REINFORCED SHOULDER PLATE

This plate is entirely new in design. Its **Top Surface** has alternate **Flat** and **Round** top ribs or corrugations, while its **Bottom Surface** is perfectly flat, except the reinforcement under the shoulder. This is an important feature—to prevent buckling and to materially strengthen the plate at the point where it is most needed.

Rolled 8″, 8½″ and 9″ long; 6″, 6½″, 7″, 8″ and 8½″ wide; ⅜″, 7/16″ and ½″ thick.

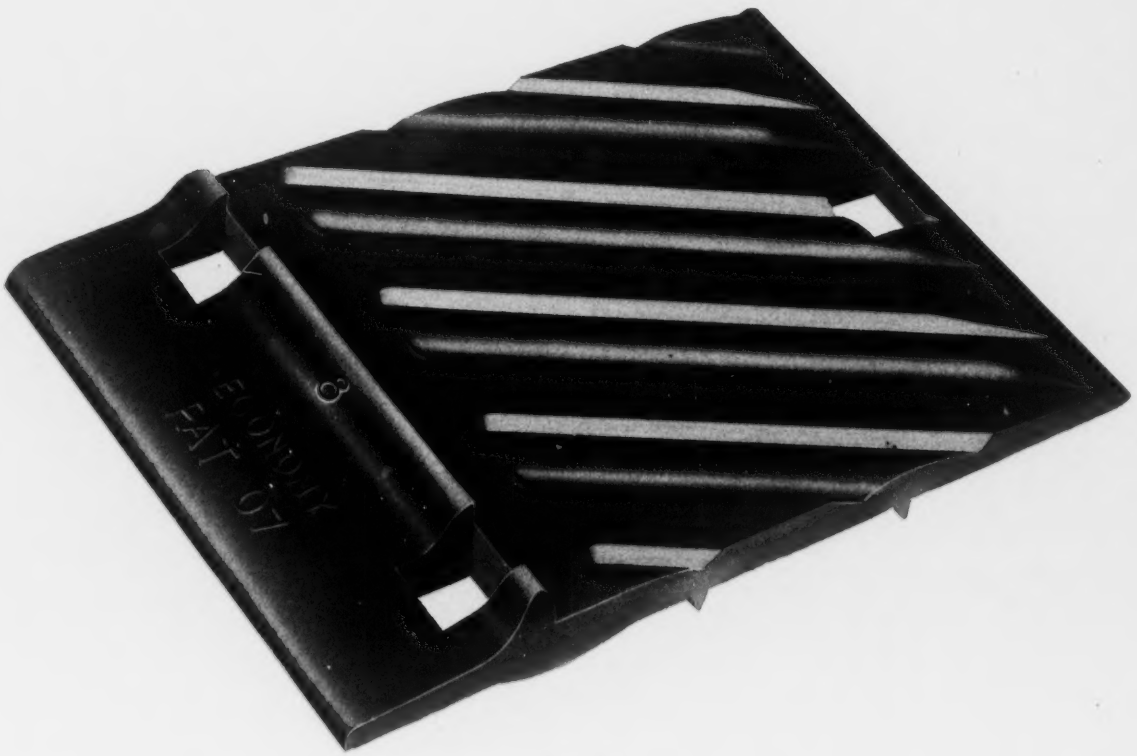
MANUFACTURED AND SOLD BY

SPENCER OTIS COMPANY

CHICAGO ST. LOUIS

NEW YORK

ECONOMY TIE PLATES



No. 8

THE ECONOMY RIBBED TOP REINFORCED SHOULDER FLANGED PLATE

This plate is entirely new, and of the same design as our No. 6 Plate, except we have added two depending flanges—designed to give the plate adhesion to the tie and assist in the holding power of the spikes.

Rolled 8″, 8½″ and 9″ long; 6″, 6½″, 7″, 8″ and 8½″ wide; ⅜″, 7/16″ and ½″ thick.

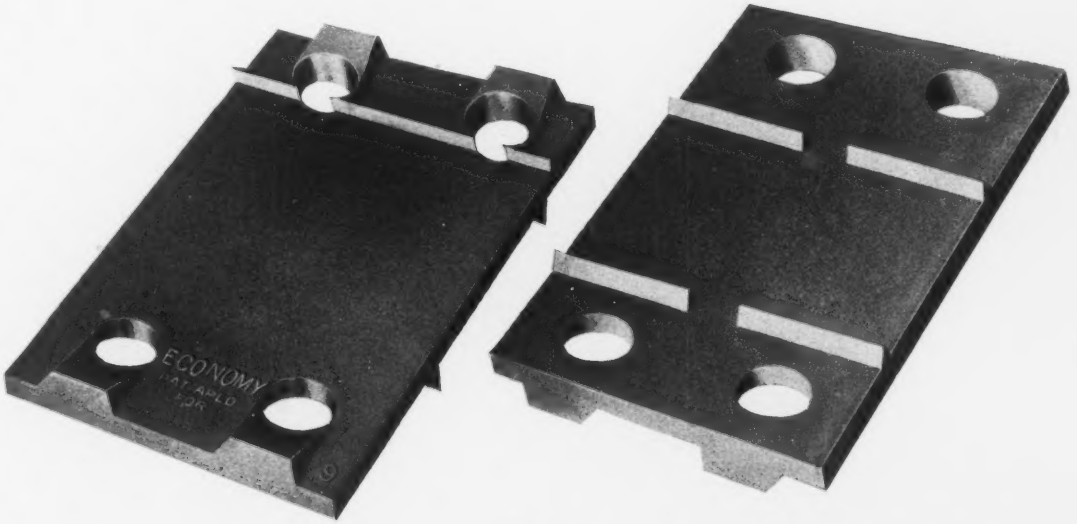
MANUFACTURED AND SOLD BY

SPENCER OTIS COMPANY

CHICAGO OMAHA

NEW YORK

ECONOMY TIE PLATES



No. 9-R

THE ECONOMY ELEVATED BOSS SHOULDER PLATE

A special plate of Rolled Steel designed to work with screw spikes. At either end are elevated bosses with the same angle as the base of the standard rail. The spike-holes act as jigs when applying spikes, and the angles of the bosses absolutely prevent the spike from assuming any but a vertical position when seated. The bosses also afford reinforcement back of the head and a bearing for the flange of the screw spike not in contact with the rail base.

We can furnish this plate perfectly **flat** on the bottom, or with **four longitudinal flanges,** also with **two transverse flanges** as shown.

Rolled 8" and 9¼" long, 6" width for 80 lb. to 100 lb. A S C E section of rail; ⅜", 7/16" and ½" thick.

Special plates for Guard Rails 13" and 15" long, 6" wide.

MANUFACTURED AND SOLD BY

SPENCER OTIS COMPANY

CHICAGO OMAHA

NEW YORK

ECONOMY TIE PLATES

Economy No. 9-S

ELEVATED BOSS SHOULDER PLATE FOR STANDARD SPIKES

A new rolled steel Tie Plate with elevated bosses and shoulder, which, with those on the field end, are so designed as to afford reinforcement back of the head and prevent bending and shearing of the standard spike.

We can furnish this plate with **four longitudinal** or with **two transverse flanges,** also perfectly **flat** on the bottom if desired.

Rolled 8″, 8½″ and 9″ long, 6″, 7½″ and 8″ width for 80 lb. to 100 lb. A S C E, also for 90 and 100 lb. A R A - A or B section of rail; ⅜″, 7/16″ and ½″ thick.

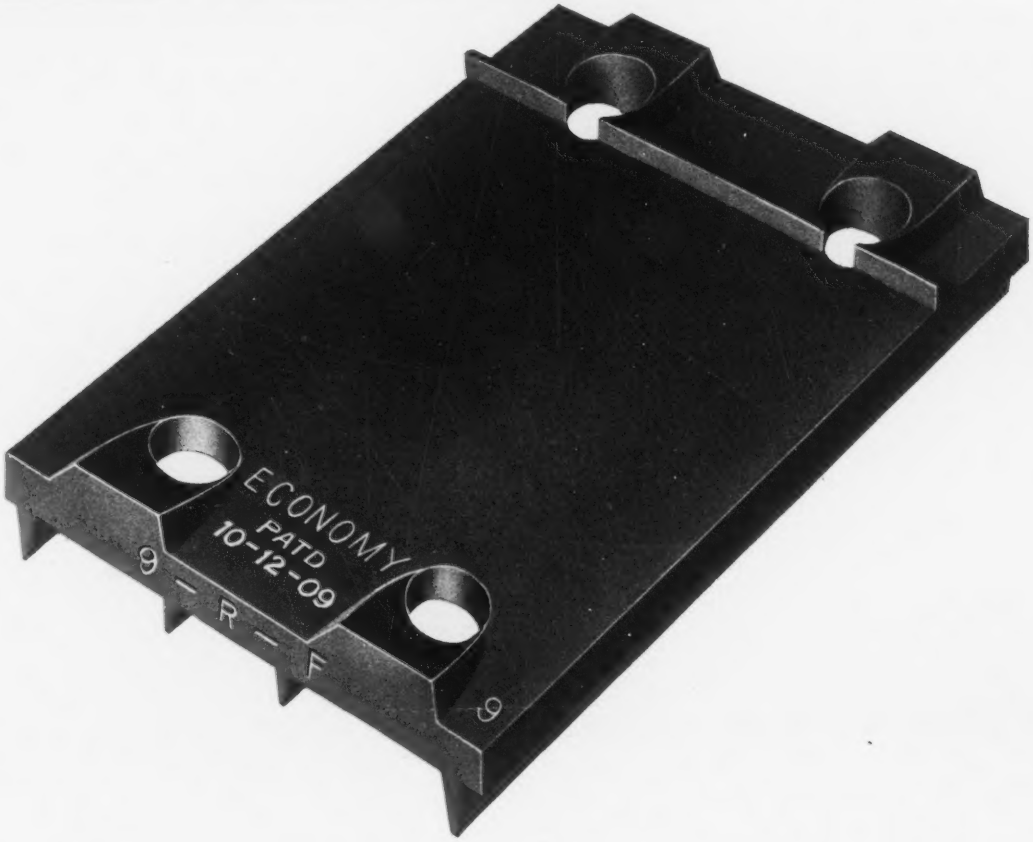
MANUFACTURED AND SOLD BY

SPENCER OTIS COMPANY

CHICAGO ST. LOUIS

NEW YORK

ECONOMY TIE PLATES



No. 9-R-F.

THE ECONOMY ELEVATED BOSS SHOULDER PLATE

A special plate of Rolled Steel designed to work with screw spikes. At either end are elevated bosses with the same angle as the base of the standard rail. The spike-holes act as jigs when applying spikes, and the angles of the bosses absolutely prevent the spike from assuming any but a vertical position when seated. The bosses also afford reinforcement back of the head and a bearing for the flange of the screw spike not in contact with the rail base.

We can furnish this plate perfectly **flat** on the bottom, or with **four longitudinal flanges** as shown.

Rolled 8" and 9" long, 6" width for 80 lb. to 100 lb. A S C E, also for 90 and 100 lb. A R A-A or B section of rail; 3/8", 7/16" and 1/2" thick.

Special plates for Guard Rails 13" and 15" long, 6" wide.

MANUFACTURED AND SOLD BY

SPENCER OTIS COMPANY

CHICAGO OMAHA

NEW YORK

ECONOMY TIE PLATES

No. 12

THE ECONOMY ROLLED STEEL TRANSVERSE FLANGE TIE PLATE

A strong plate materially reduced in weight. **Note** the area of rail bearing surface as compared with other plates of like character. The transverse flanges furnish adhesion to the tie and will prevent spreading of the rails. Furnished without flanges if desired.

Rolled—9" long and to widths 5" to 8"; 7/16", ½" or thicker if wanted.

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SPENCER OTIS COMPANY

CHICAGO OMAHA

NEW YORK

ECONOMY TIE PLATES

Economy No. 14

This design of Rolled Steel Tie Plate seems to meet with favor where an extra high shoulder is required. We are prepared to furnish this plate either for two, three, or four hole punching. Above cut shows shoulder arrangement for two or four hole punching.

Rolled 8″, 8½″ and 9″ normal lengths; 5″, 6″, 7″ and 8″ widths; ⅜″, 7/16″ and ½″ thick.

MANUFACTURED AND SOLD BY

SPENCER OTIS COMPANY

CHICAGO ST. LOUIS

NEW YORK

1585 & 1586 U. S. Cir. Ct., N. Dist. Ill., Eastern Div.

RAILROAD SUPPLY CO.

vs.

HART STEEL CO. & G. S. WOOD.

U. S. Cir. Ct., No. Dist. Ohio, Eastern Div.

RAILROAD SUPPLY CO.

vs.

ELYRIA STEEL & IRON CO.

DEFENDANTS' EXHIBIT L. L.

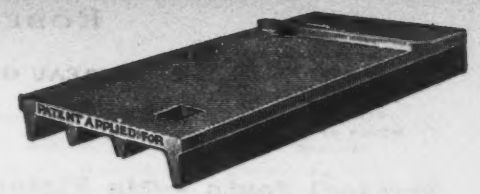
KATE S. HOLMES,
Notary Public.

DEFENDANTS' EXHIBIT LL.

03

THE HART STEEL COMPANY

RAILROAD TIE PLATES

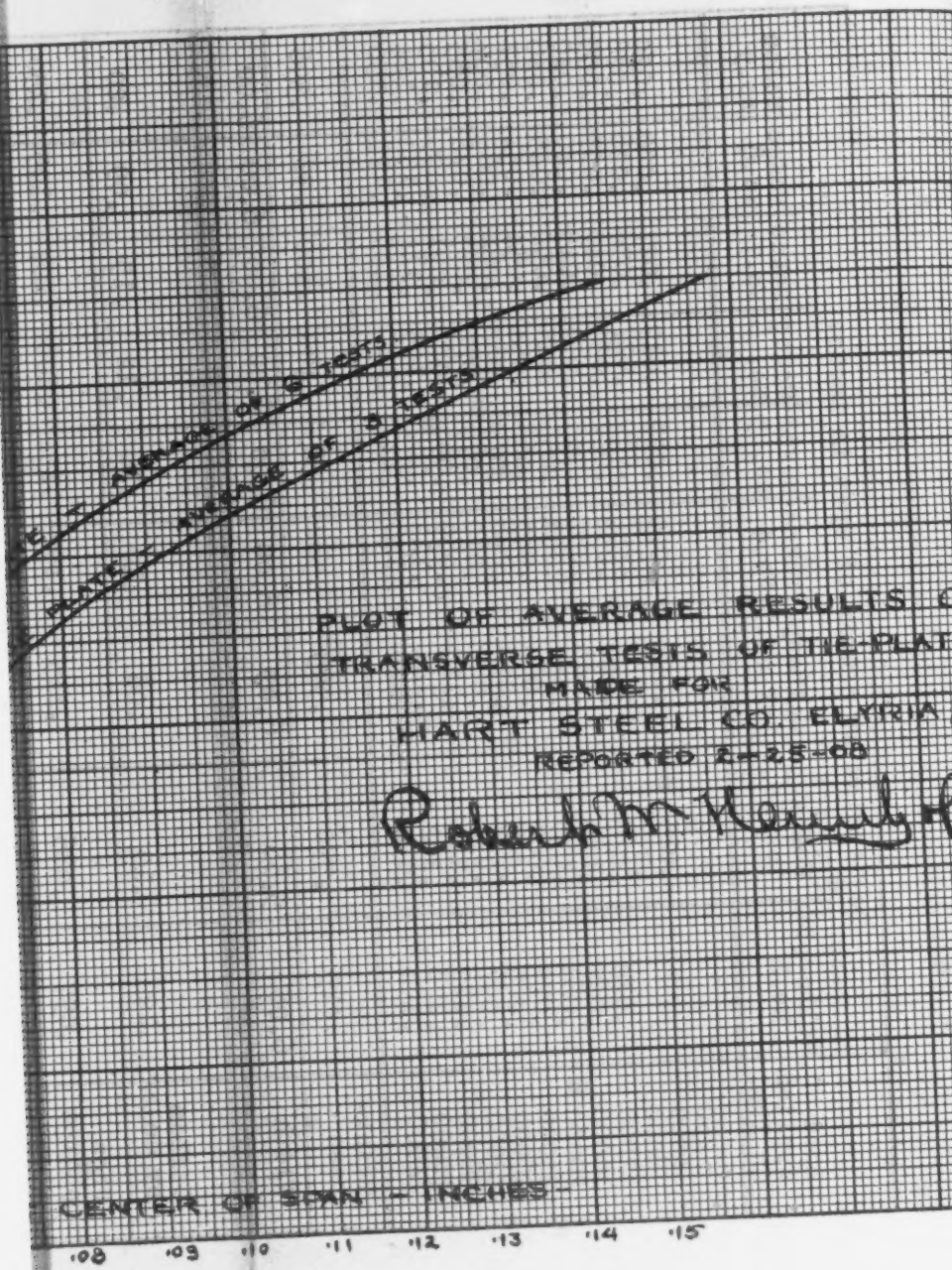


ELYRIA, OHIO.

COMPARATIVE TEST OF SHOULDER TIE PLATES.

We take pleasure in submitting herewith report which we have recently received from R. W. Hunt & Co. We were very much surprised when one of our competitors published in their catalogue a comparative test of their Shoulder Plate and our McKee Plate.

We feel that this test is unfair for several reasons. First, because no comparison is worth anything, which does not compare all the affecting conditions. That is, the width, the punchings and the exact thickness of the several plates should be given, as well as the carbon contents of the steel, of which the test plates were rolled. All these conditions, we believe, are fully covered in our report from R. W. Hunt & Co. The report can be reduced to the following comparison.


PLOT OF AVERAGE RESULTS O
TRANSVERSE TESTS OF TIE-PLAT
MADE FOR
HART STEEL CO. ELYRIA
REPORTED 2-25-08
Robert W. Hunt
CENTER OF SPAN - INCHES
.08
.09
.10
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.12
.13
.14
.15

1009

TIE PLATES
and
SPIKES

THE HART STEEL COMPANY
General Sales Office and Mill
Elyria, Ohio

Sales Offices:
NEW YORK ATLANTA
CHICAGO SAN FRANCISCO

Catalog No. 3

1010

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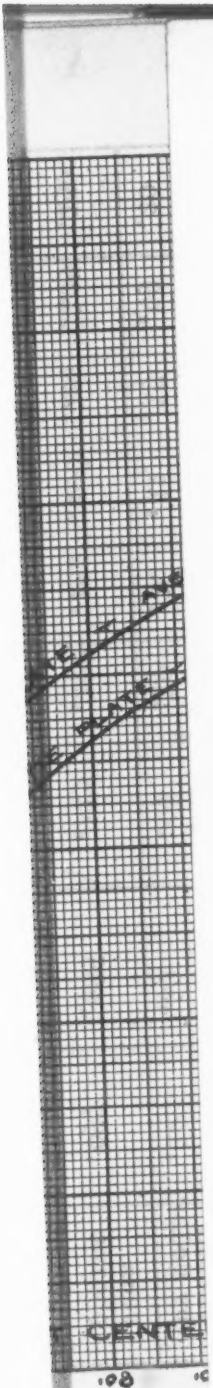
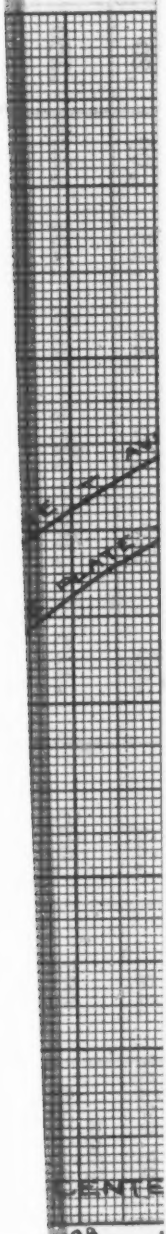
The Hart Steel Company
Elyria, Ohio



Special Notice

ALL of the Tie Plates and Spikes sold by The Hart Steel Company are manufactured by The Elyria Iron & Steel Company, Elyria, Ohio.

The commercial relations of these two companies are very closely allied, The Hart Steel Company being the selling organization for the railway products of The Elyria Iron & Steel Company.



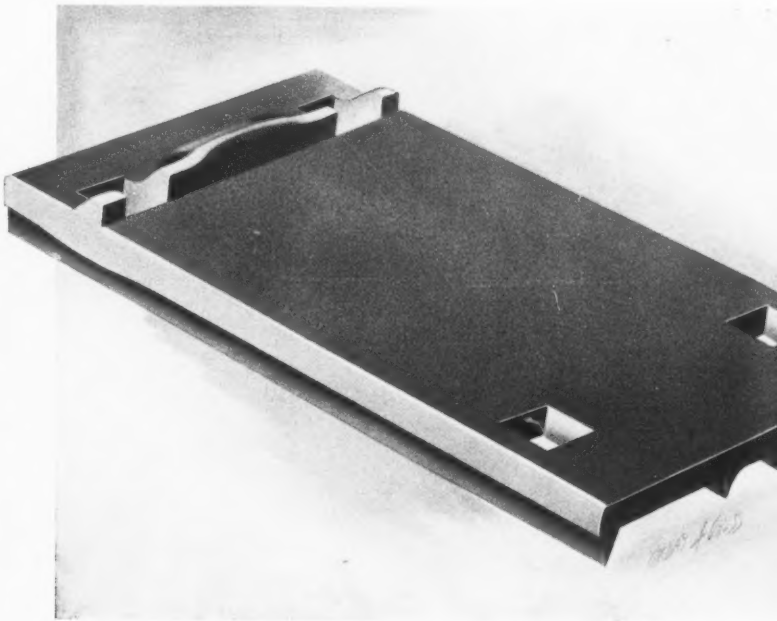
WE believe it is now fully conceded that the use of tie plates in railway track maintenance effects great economy by increasing the life of ties and reducing renewals and maintenance work, thus ensuring a better and more permanent track. The fact that now practically all railways are using increasingly large quantities of tie plates, makes it unnecessary to enter into the merits of their use, as all engineering and maintenance of way departments are fully alive to the needs and requirements of this essential part of the track equipment.

The plates shown in this catalog embrace the best and widest know types, from the old flat top Servis to the new *McKee Rolled Steel, Longitudinal-Flanged, Shoulder Tie Plate.* This McKee type of plate we believe is the embodiment of all the best advanced ideas along the line of tie plate design, and we are the *original* producers of a *rolled steel, longitudinal-flanged, shoulder tie plate.* Practically all of the *flat bottom* shoulder tie plates are made thicker at the outer edge of the rail, in order to withstand the excessive buckling strain at that point. Our McKee shoulder plate is the only *longitudinal-flanged, shoulder plate* which incorporates this idea, the plate being thickened adjacent to the shoulder, thereby reinforcing the plate at that point, and strengthening what is universally conceded to be the weakest point of all plates. The practical result of this reinforcement is fully demonstrated and set forth in Robert W. Hunt & Co.'s report of tests, as shown in detail on page 18.

1016

McKee Four Flange, Rolled Steel

Reinforced Shoulder Plate



Style C

The center section of the shoulder on this plate is ½ inch high, with $\frac{5}{16}$-inch shoulder on either side, so as to readily permit insertion of claw bar for the removal of spikes.

Shoulder . . . . . ½ inch high in center, $\frac{5}{16}$ inch high at

Length . . . . . 7, 7½, 8, 8½, 9, 9½, 10, 10½ and

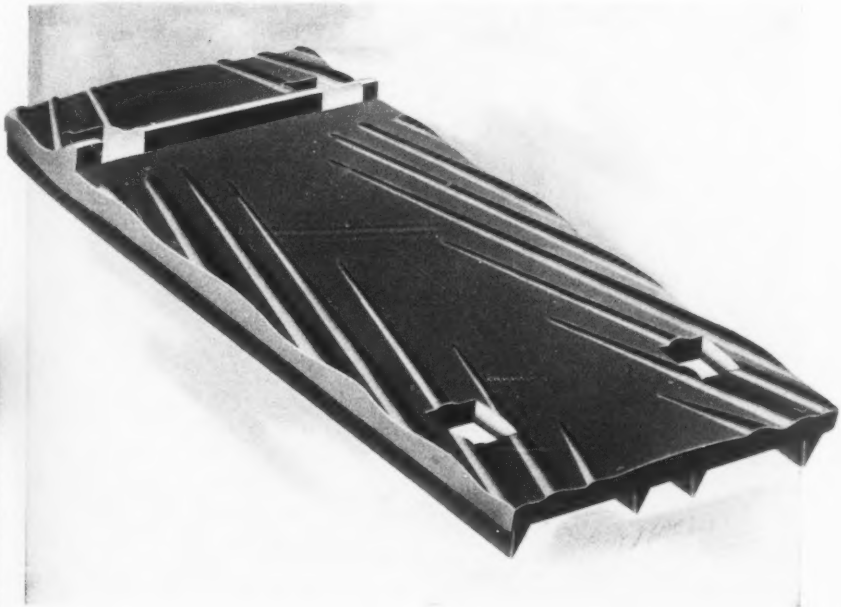
Width . . . . . 5 and 6 inches.

Thickness . . . . . $\frac{3}{8}$, $\frac{7}{16}$ and ½ inches.

1017

Corrugated Top, Four Flange

Rolled Steel Shoulder Plate



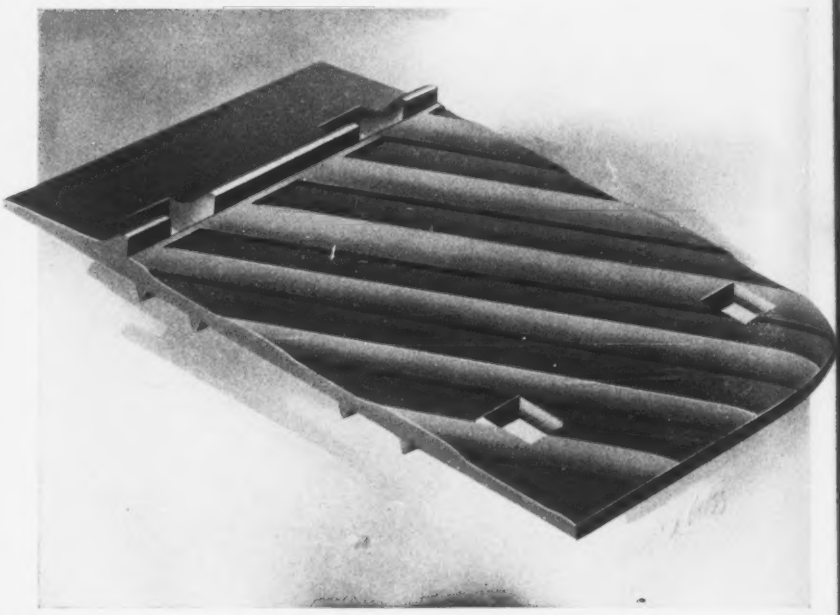
Style D

Shoulder	$\frac{1}{4}$, $\frac{5}{16}$ and $\frac{3}{8}$ inches high.
Length	7, 7½, 8, 8½, 9, 9½, 10, 10½ and 11 inches.
Width	5 and 6 inches.
Thickness	$\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$ and ½ inches.

1018

Corrugated Top, Parallel Flange

Rolled Steel Shoulder Plate

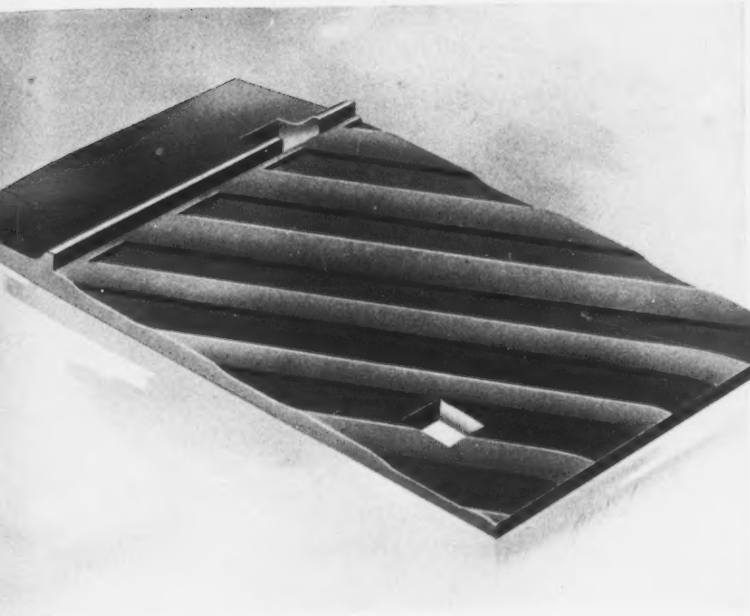


Style E

Shoulder	$\frac{5}{16}$ inch high.
Length	7, 7½, 8, 8½ and 9 inches.
Any width.	
Thickness	$\frac{3}{8}$, $\frac{7}{16}$ and ½ inch.
Flanges	$\frac{1}{8}$ inch long.

Corrugated Top, Flat Bottom

Rolled Steel Shoulder Plate



Style F

lder . . . . . $\frac{5}{16}$ inch high.

th . . . . . 7, 7½, 8, 8½ and 9 inches.

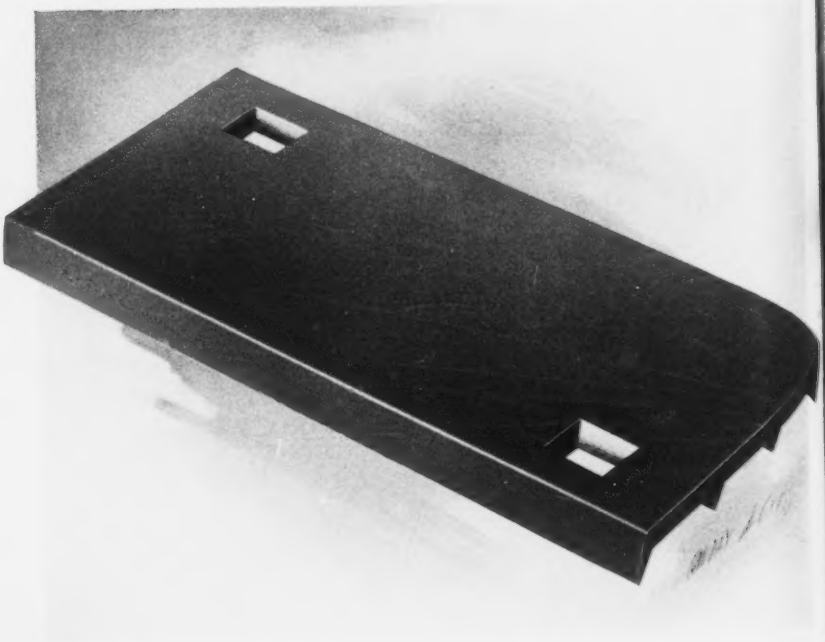
width.

kness . . . . . $\frac{3}{8}$, $\frac{7}{16}$ and ½ inches.

1020

The Servis, Four Flange

Rolled Steel Plate



Style G

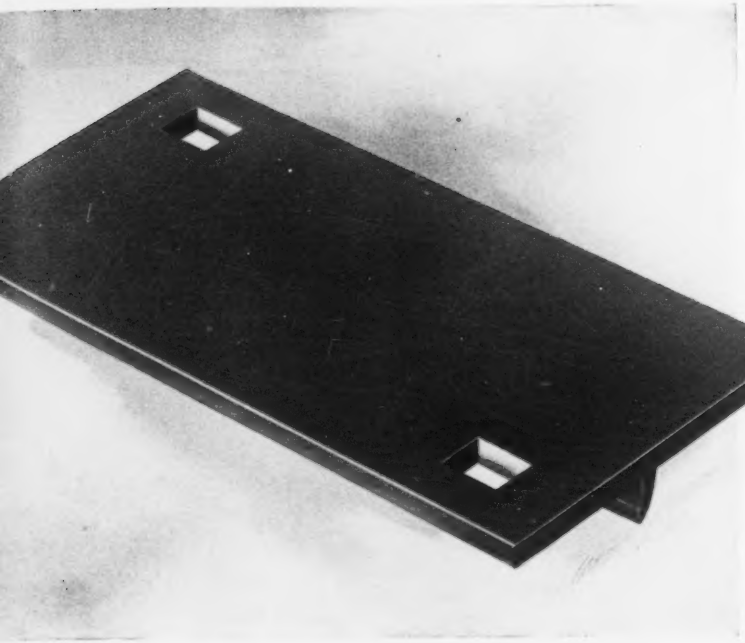
Any length.

Width . . . . . 5 and 6 inches.

Thickness . . . . . ¼, 5/16 and 3/8 inches.

Flat Top, Single Flange

Rolled Steel Plate



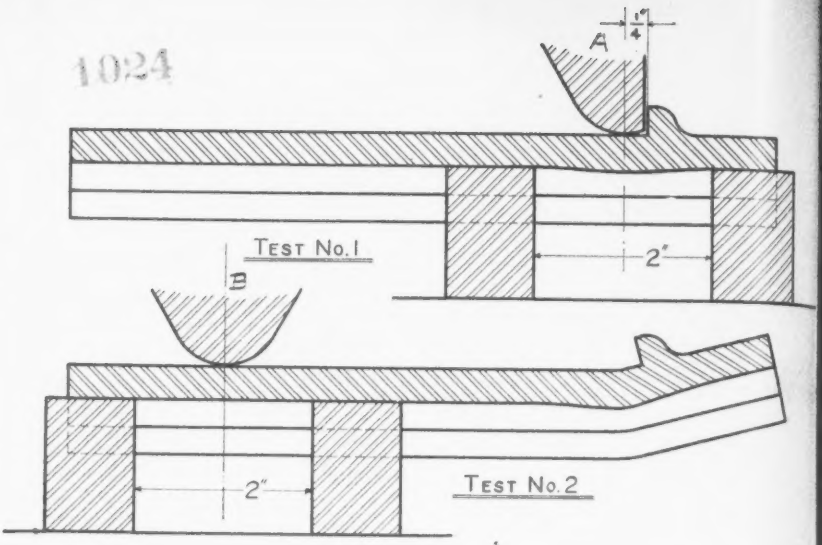
Style H

ength.

. . . . . 5 and 6 inches.

ness . . . . . $\frac{5}{16}$ and $\frac{3}{8}$ inches.

1024



Loads as Applied Pounds	Test No. 1 Deflection Inches	Test No. 2 Deflection Inches
250	0	0
4000	.022	.022
8000	.029	.030
12000	.035	.038
16000	.042	.056
20000	.054	.070
24000	.066	.081
28000	.081	.100
32000	.101	.129
36000	.122	.165
40000	.154	.210
44000	.188	.248
48000	.221	.285

The above test shows that the average deflection at the shoulder—the reinforced point—is 22⅓ per cent less than in the body of the plate.

Spikes

Standard Sizes

$5\frac{1}{2}$ x $\frac{9}{16}$ inches 6 x $\frac{5}{8}$ inches

Our Spikes are manufactured to withstand the most rigid bending, flattening and twisting tests.

1026

Important Information Required

When Ordering Tie Plates

Style of Plate.
Length of Plate.
Width of Plate.
Thickness of Plate.
Height of Shoulder.

Rail Base.

Size of Spikes.

Number of holes required—if three holes, are there one or two in shoulder?

On joint plates, the following information is required:

Stagger of holes in angle bars.

In two-hole punching, are they one-half rights and one-half lefts, or all rights, or all lefts?

What is the width out to out of angle bars?

Should shoulder of joint plates butt against rail or against angle bar? If against rail, send drawing showing clearance between angle (or splice) bar and rail.

When center joint plates are used, specify same separate from end joints.

On account of the widening of spike under the head, it is necessary to use a wider hole in shoulder punchings.

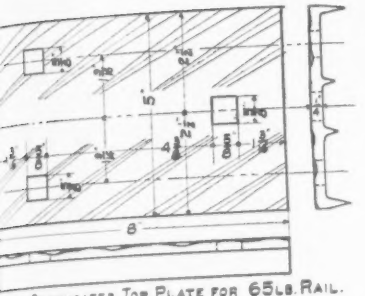
On the following page is shown a diagram illustrating the method of applying right- and left-hand plates.

1027

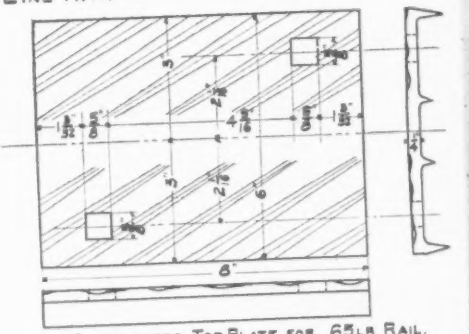
1028

THE following pages represent a collection of diagrams showing the punching data for a number of different rail bases used by a few railway lines for whom we have furnished tie plates. If blue prints are dimensioned in manner shown in these diagrams for intermediate and joint plates, the railroad's requirements can be intelligently interpreted.

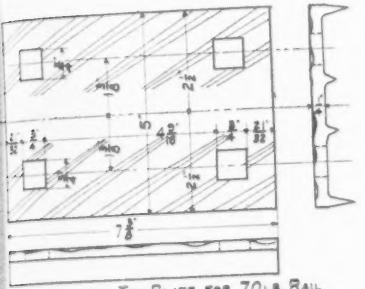
Atlantic Coast Line R.R.



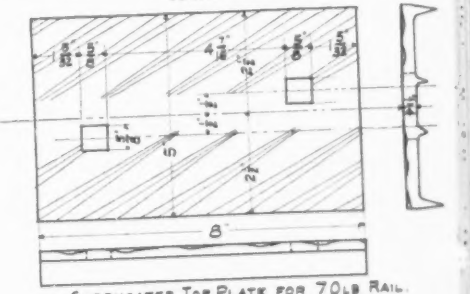
Corrugated Top Plate for 65lb. Rail.
Intermediate.



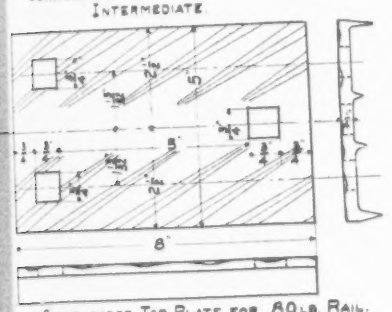
Corrugated Top Plate for 65lb. Rail.
Joint.



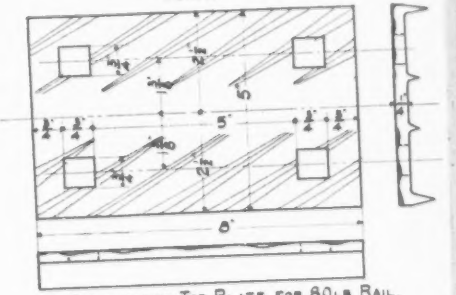
Corrugated Top Plate for 70lb. Rail.
Intermediate



Corrugated Top Plate for 70lb Rail.
Joint.

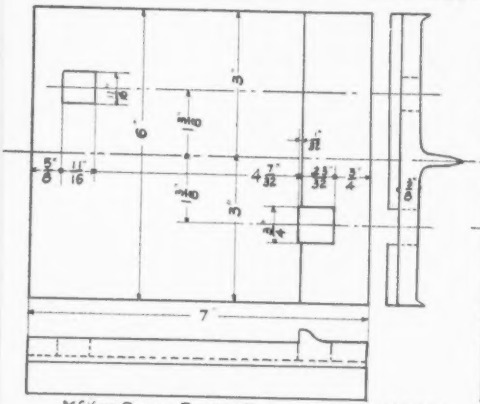


Corrugated Top Plate for 80lb. Rail.
Intermediate

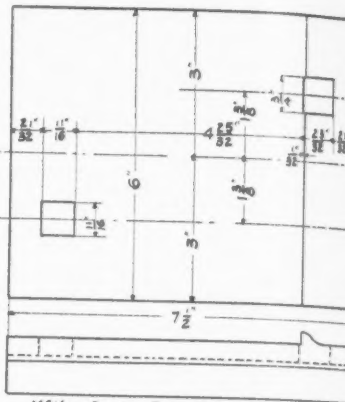


Corrugated Top Plate for 80lb Rail.
Joint

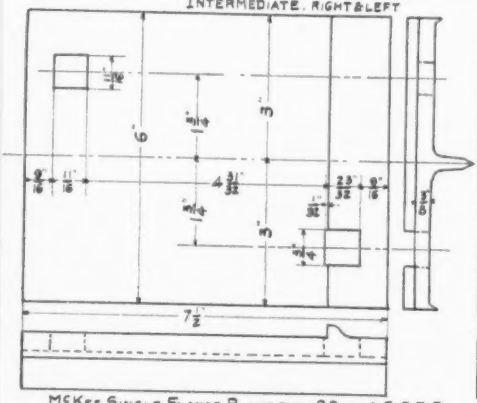
Alabama Great Southern R.R.



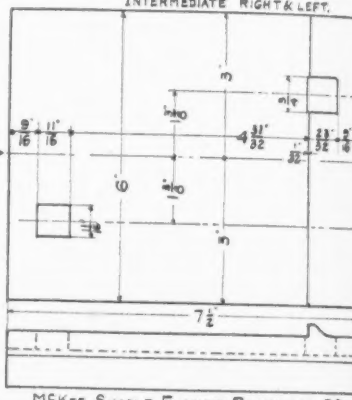
McKee Single Flange Plate for 60lb A.S.C.E. Rail. Intermediate. Right & Left



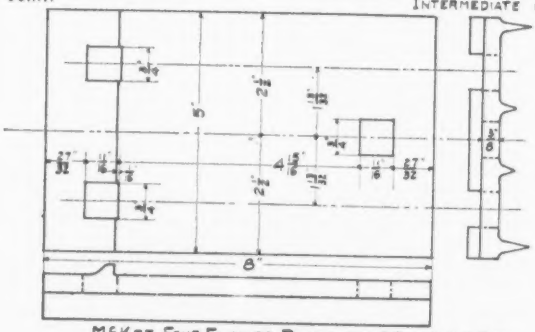
McKee Single Flange Plate for 75lb Intermediate Right & Left.



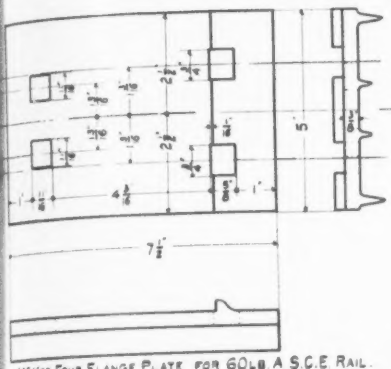
McKee Single Flange Plate for 80lb A.S.C.E Rail Joint.



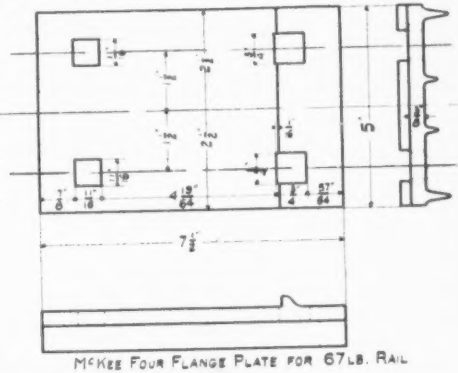
McKee Single Flange Plate for 80l Intermediate Right & Left



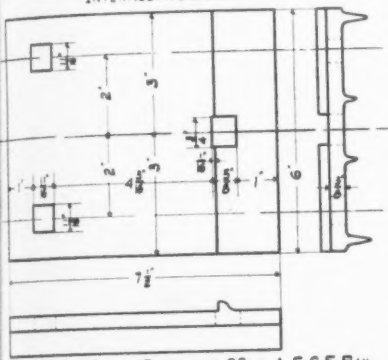
McKee Four Flange Plate for 80lb A.S.C.E Rail. Intermediate.



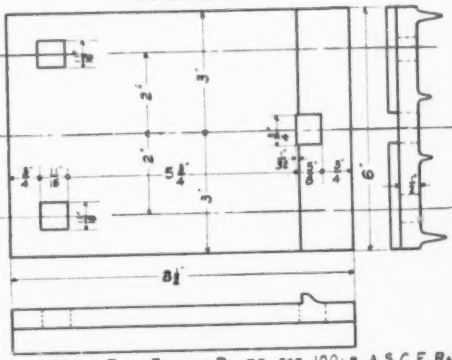
McKEE FOUR FLANGE PLATE FOR 60LB A.S.C.E. RAIL. INTERMEDIATE & JOINT.



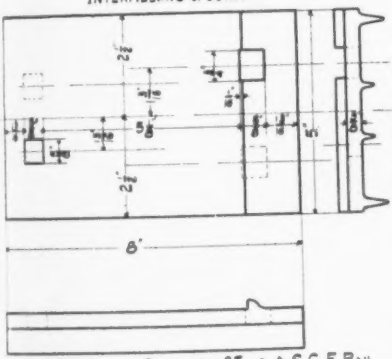
McKEE FOUR FLANGE PLATE FOR 67LB. RAIL INTERMEDIATE.



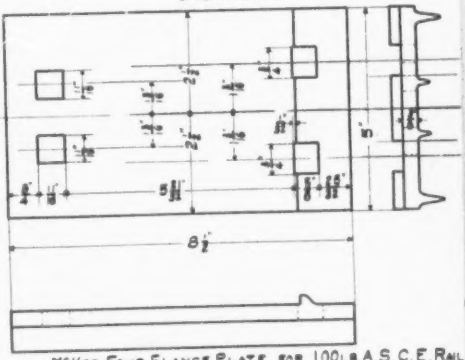
McKEE FOUR FLANGE PLATE FOR 60LB. A.S.C.E RAIL INTERMEDIATE & JOINT



McKEE FOUR FLANGE PLATE FOR 100LB. A.S.C.E. RAIL. INTERMEDIATE



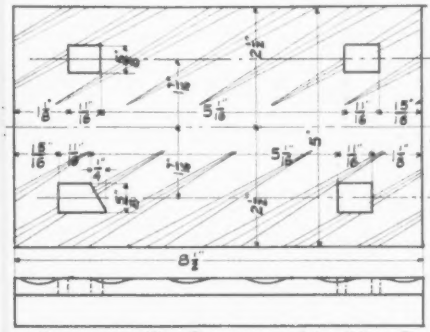
McKEE FOUR FLANGE PLATE FOR 85 LB A.S.C.E RAIL INTERMEDIATE - JOINT. RIGHT & LEFT.



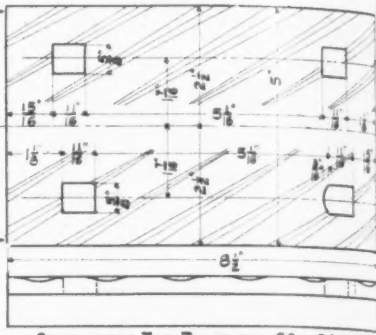
McKEE FOUR FLANGE PLATE FOR 100LB.A.S.C.E.RAIL INTERMEDIATE - JOINT.

1034

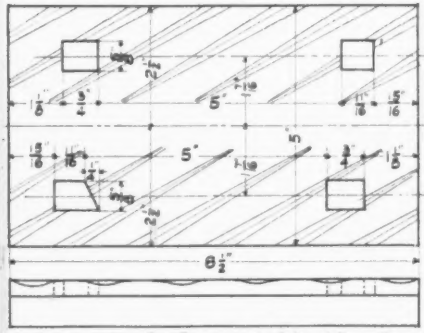
Chicago & North Western Ry.



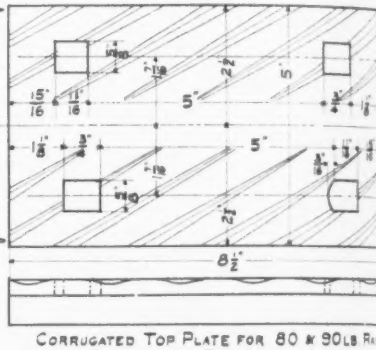
Corrugated Top Plate for 80 & 90 lb. Rails.
Combination-Intermediate- Left.



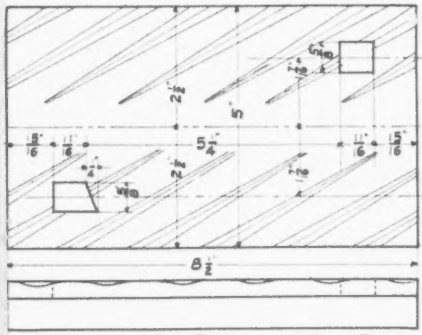
Corrugated Top Plate for 80 & 90 lb. Rails.
Combination-Intermediate- Right



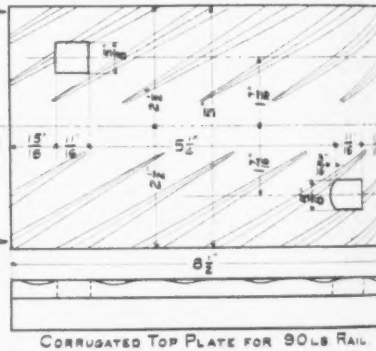
Corrugated Top Plate for 80 & 90 lb. Rails.
Combination-Intermediate- Left



Corrugated Top Plate for 80 & 90 lb. Rails.
Combination-Intermediate- Right

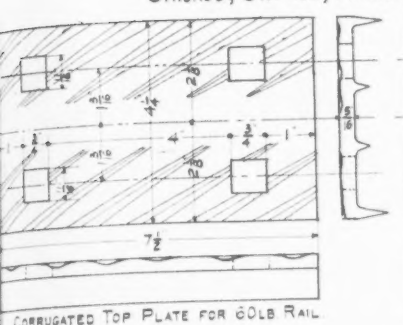


Corrugated Top Plate for 90 lb. Rail
Intermediate Left

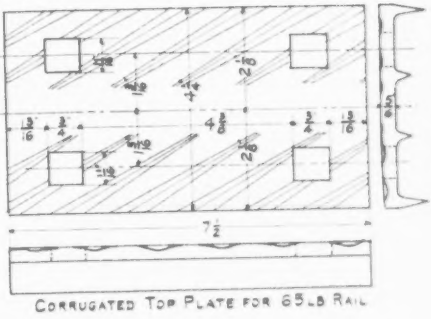


Corrugated Top Plate for 90 lb. Rail
Intermediate - Right.

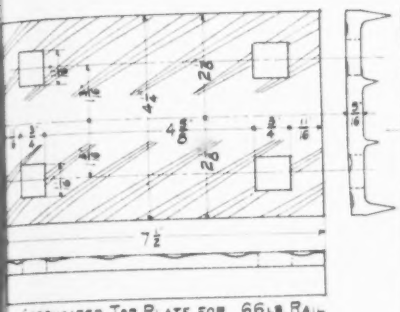
CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA RY.



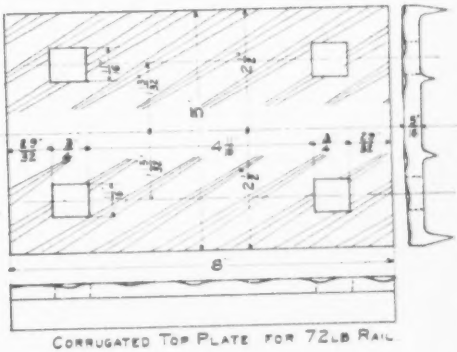
CORRUGATED TOP PLATE FOR 60LB RAIL



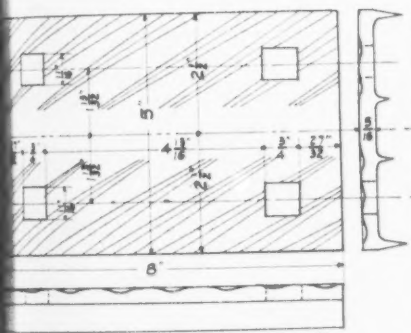
CORRUGATED TOP PLATE FOR 65LB RAIL



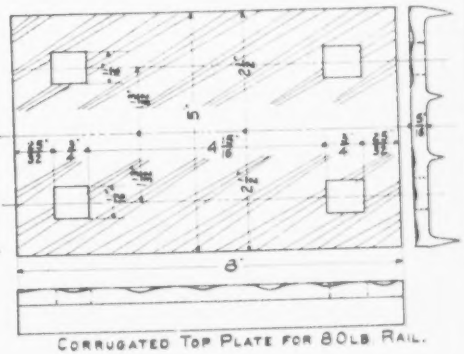
CORRUGATED TOP PLATE FOR 66LB RAIL



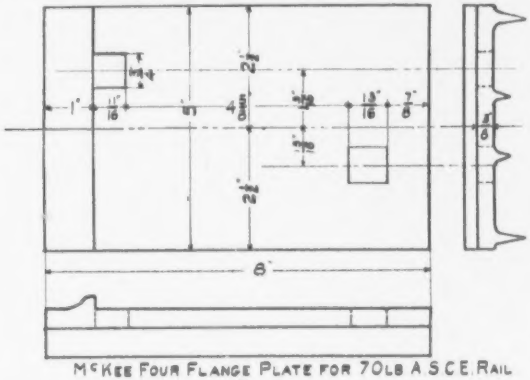
CORRUGATED TOP PLATE FOR 72LB RAIL



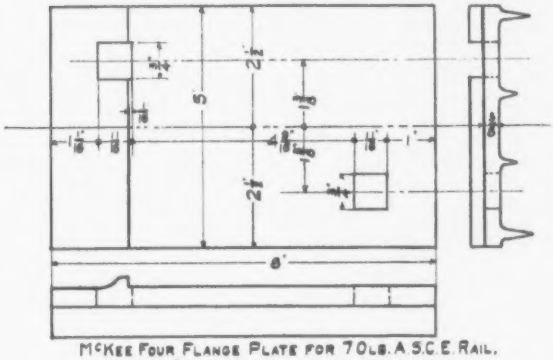
CORRUGATED TOP PLATE FOR 73LB RAIL.



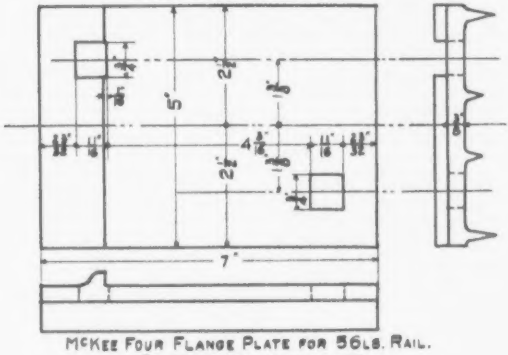
CORRUGATED TOP PLATE FOR 80LB RAIL.



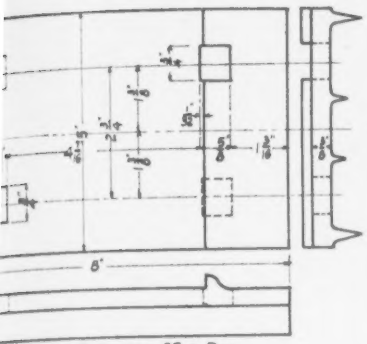
McKEE FOUR FLANGE PLATE FOR 70LB A.S.C.E. RAIL JOINT.



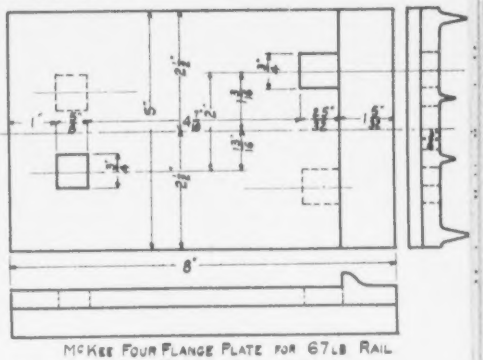
McKEE FOUR FLANGE PLATE FOR 70LB. A.S.C.E. RAIL. INTERMEDIATE. RIGHT & LEFT.



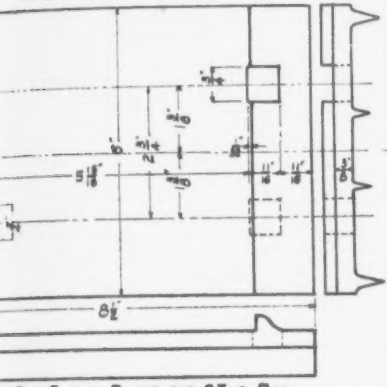
McKEE FOUR FLANGE PLATE FOR 56LB. RAIL. INTERMEDIATE. RIGHT & LEFT.



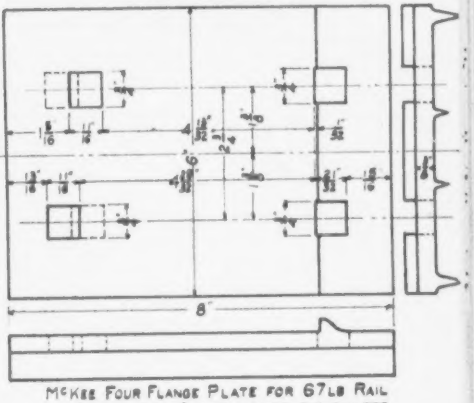
Four Flange Plate for 67 lb Rail
Intermediate - Right & Left



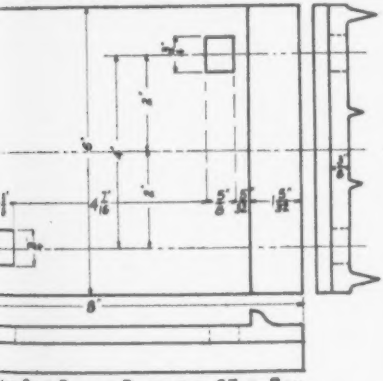
McKee Four Flange Plate for 67 lb Rail
Joint. - Right & Left.



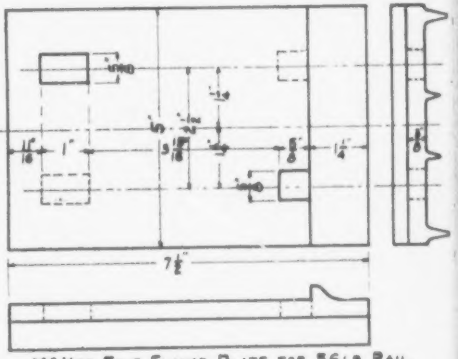
e Four Flange Plate for 67 lb Rail
Center Joint - Right & Left



McKee Four Flange Plate for 67 lb Rail
Combination - Intermediate Right & Left



ee Four Flange Plate for 67 lb Rail
End Joint - Left only



McKee Four Flange Plate for 56 lb Rail
Joint - Right & Left

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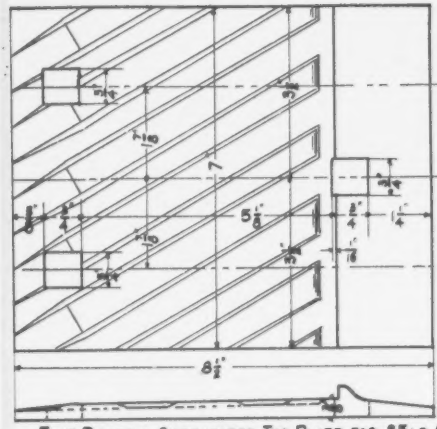
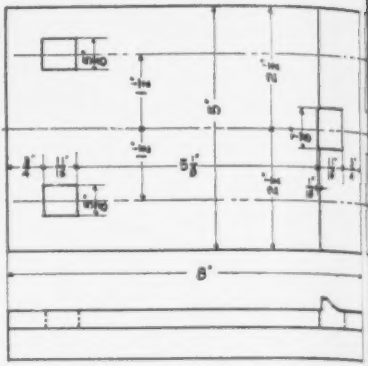
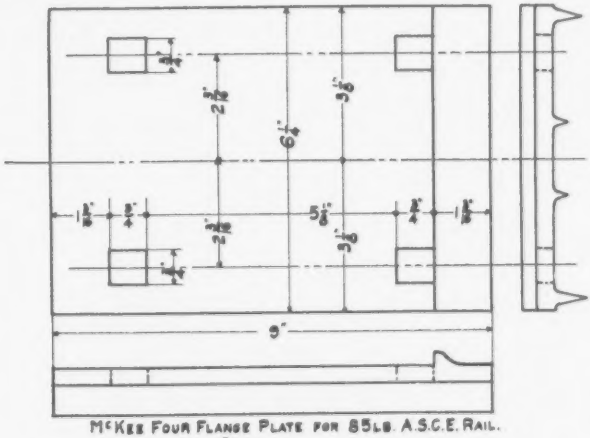
DENVER & RIO GRANDE R.R.



FLAT BOTTOM CORRUGATED TOP PLATE FOR 85 LB. A.S.C.E. RAIL INTERMEDIATE.

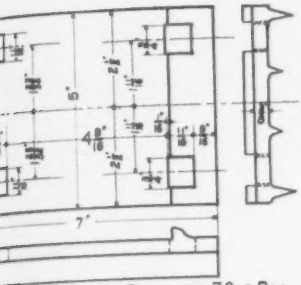


McKEE FOUR FLANGE PLATE FOR 85 LB. A.S.C.E. INTERMEDIATE.

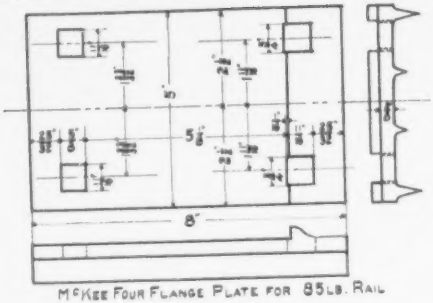


McKEE FOUR FLANGE PLATE FOR 85 LB. A.S.C.E. RAIL. JOINT.

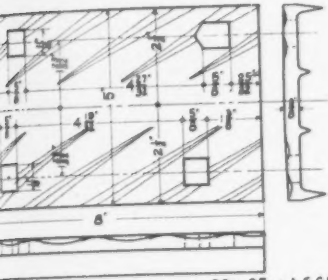
Grand Rapids & Indiana Ry.



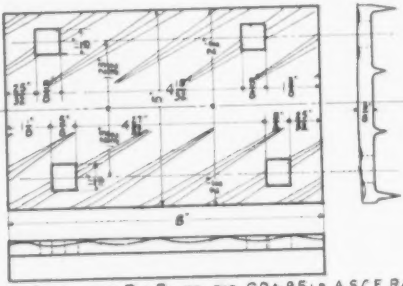
KEE FOUR FLANGE PLATE FOR 70 LB RAIL.



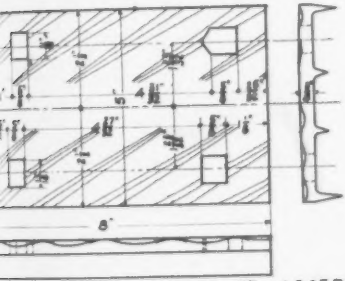
McKEE FOUR FLANGE PLATE FOR 85 LB. RAIL



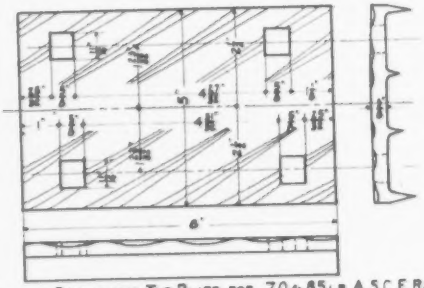
CORRUGATED TOP PLATE FOR 60 & 85 LB. A.S.C.E. RAILS.



CORRUGATED TOP PLATE FOR 60 & 85 LB. A.S.C.E. RAILS.

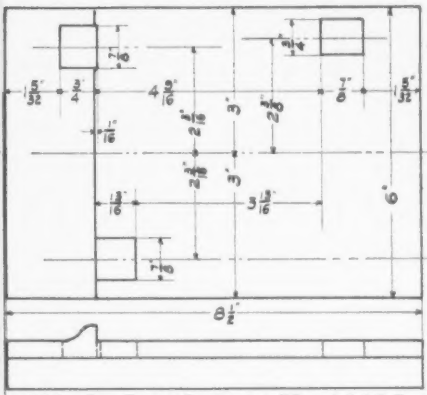


CORRUGATED TOP PLATE FOR 70 & 85 LB. A.S.C.E. RAILS.

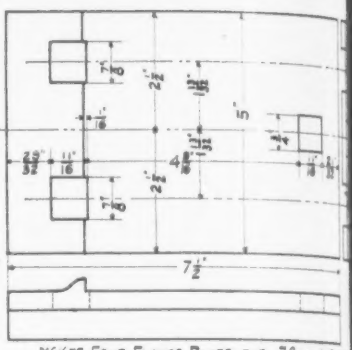


CORRUGATED TOP PLATE FOR 70 & 85 LB. A.S.C.E. RAILS

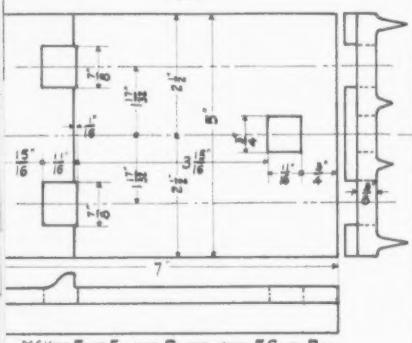
Hocking Valley and Ohio Central Lines.



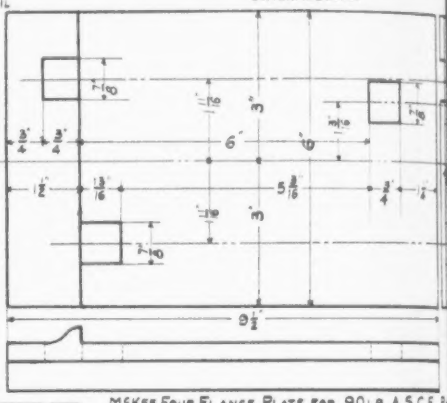
McKee Four Flange Plate for 70 lb A.S.C.E. Rail Joint.



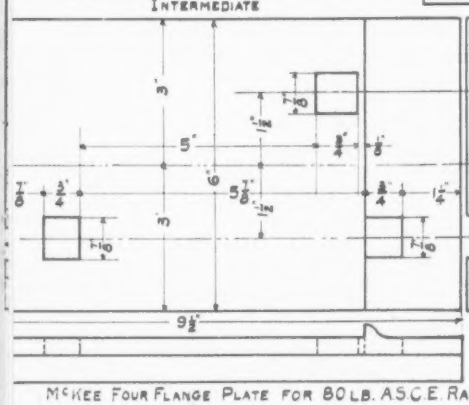
McKee Four Flange Plate for 70 lb A.S.C.E. Intermediate.



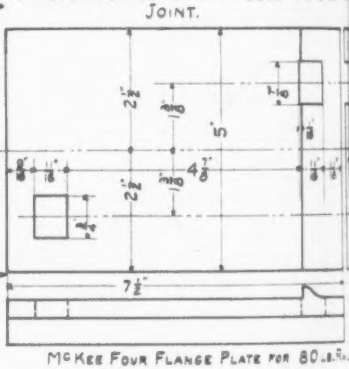
McKee Four Flange Plate for 56 lb. Rail Intermediate



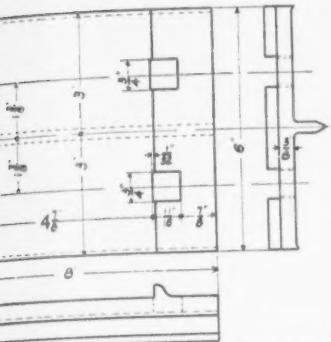
McKee Four Flange Plate for 90 lb. A.S.C.E. Joint.



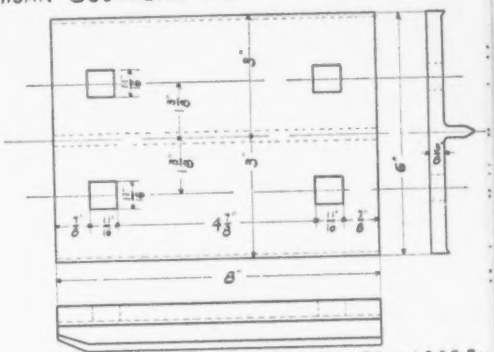
McKee Four Flange Plate for 80 lb. A.S.C.E. Rail. Joint.



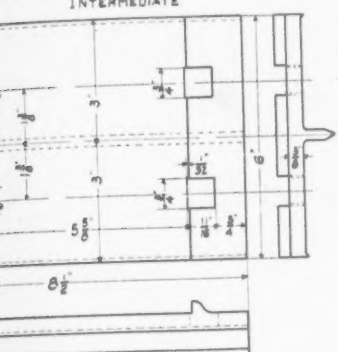
McKee Four Flange Plate for 80 lb. Rail Intermediate - Right & Left.



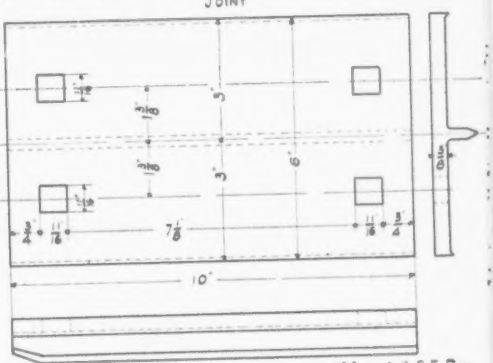
E SINGLE FLANGE PLATE FOR 80 LB A.S.C.E. RAIL
INTERMEDIATE



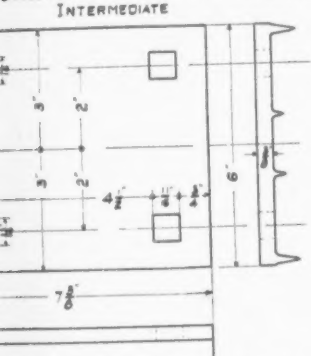
FLAT TOP SINGLE FLANGE PLATE FOR 80 LB A.S.C.E. RAI
JOINT



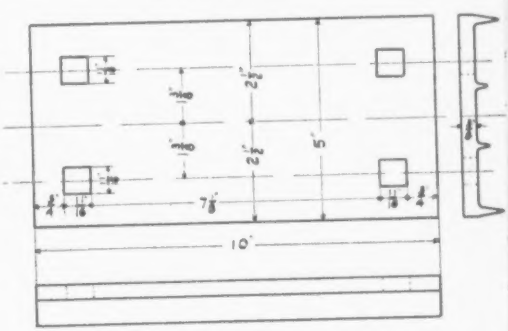
SINGLE FLANGE PLATE FOR 100 LB A.S.C.E. RAIL
INTERMEDIATE



FLAT TOP SINGLE FLANGE PLATE FOR 100 LB A.S.C.E. RAIL
CENTER OF SPLICE



P FOUR FLANGE PLATE FOR 70 LB A.S.C.E. RAIL
JOINT



FLAT TOP FOUR FLANGE PLATE FOR 100 LB A.S.C.E. RAIL
CENTER OF SPLICE

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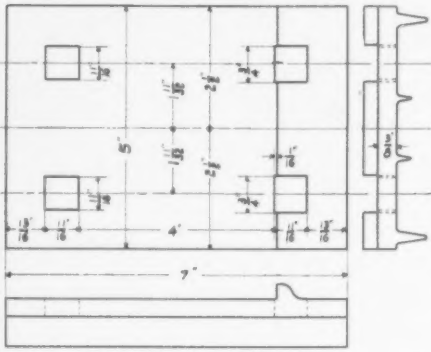
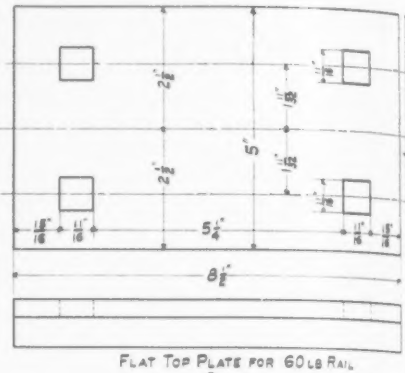
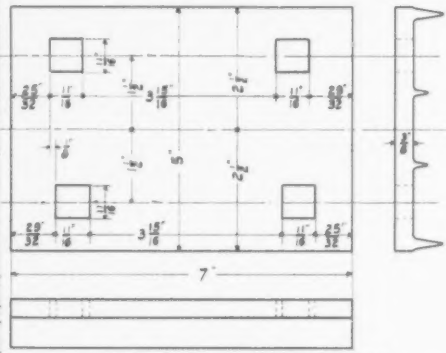
Lake Shore & Michigan Southern Ry.



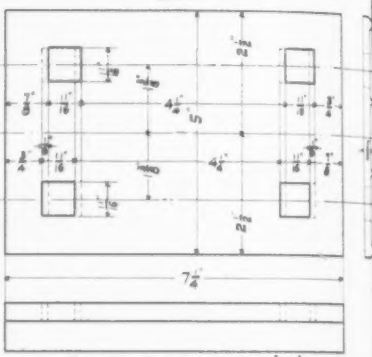
McKee Plate for 60 lb Rail
Intermediate



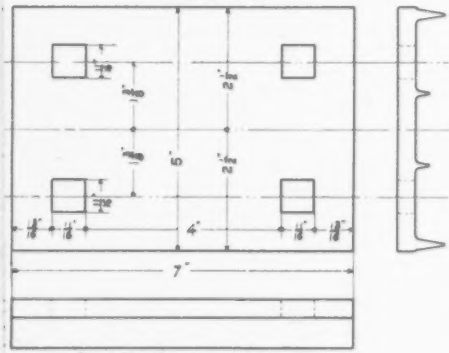
Flat Top Plate for 60 lb Rail
Joint



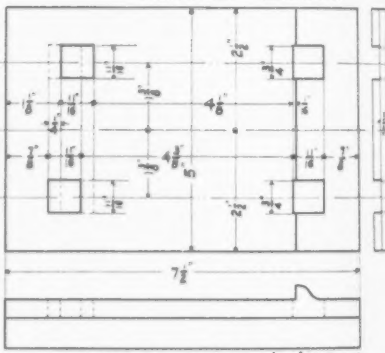
Flat Top Plate for 56 & 60 lb Rails
Combination



Flat Top Plate for 65 lb. '88-'89 Pat. Rail
Combination - Right & Left

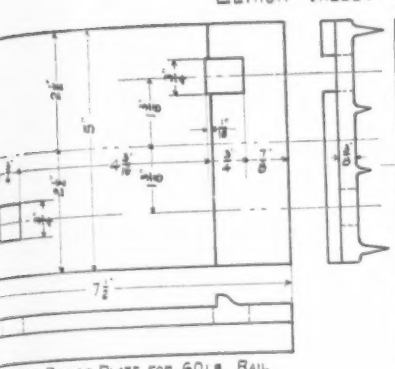


Flat Top Plate for 60 lb Rail
Intermediate

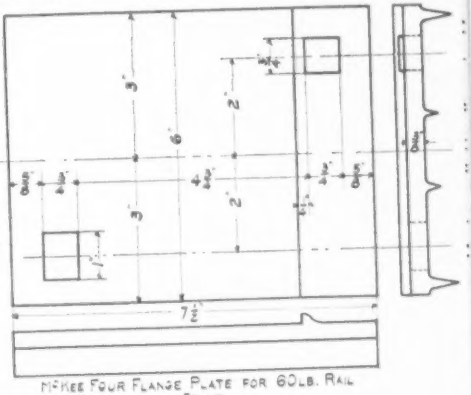


McKee Plate for 65 lb. '88-'89 Pat. Rail
Intermediate - Combination - Right & Left

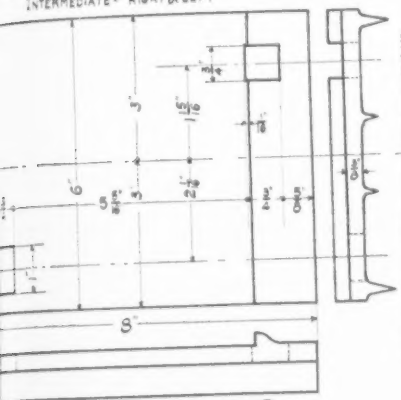
LEHIGH VALLEY RAILROAD



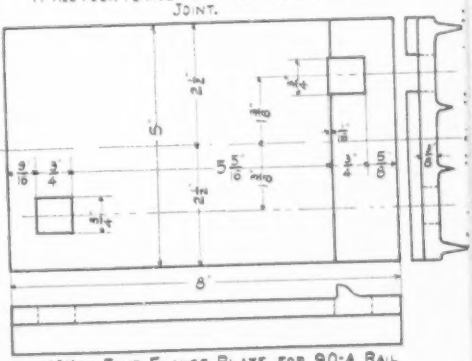
...EE FOUR FLANGE PLATE FOR 60LB RAIL
INTERMEDIATE - RIGHT & LEFT



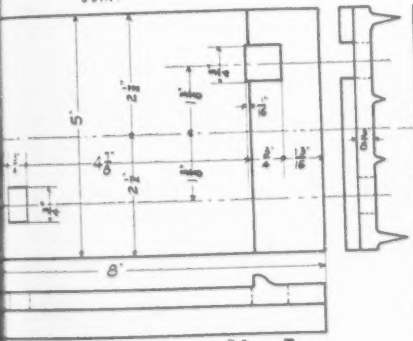
McKEE FOUR FLANGE PLATE FOR 60LB. RAIL
JOINT.



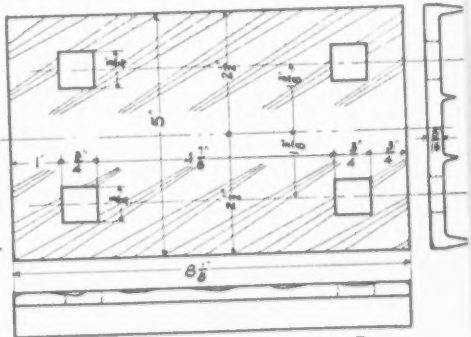
...EE FOUR FLANGE PLATE FOR 90-A RAIL.
JOINT



McKEE FOUR FLANGE PLATE FOR 90-A RAIL
INTERMEDIATE - RIGHT & LEFT

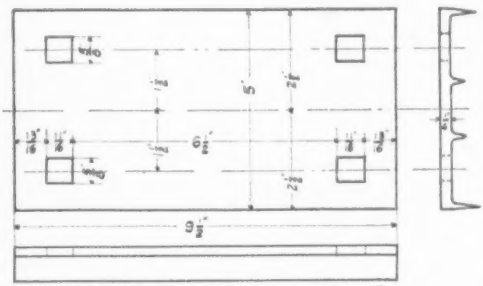


...KEE FOUR FLANGE PLATE FOR 80LB RAIL.
INTERMEDIATE - JOINT - RIGHT & LEFT.

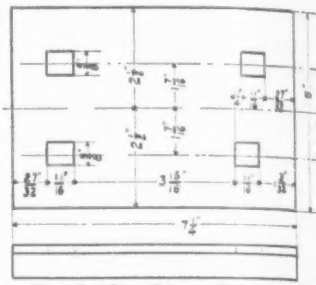


CORRUGATED TOP PLATE FOR 80LB RAIL
INTERMEDIATE

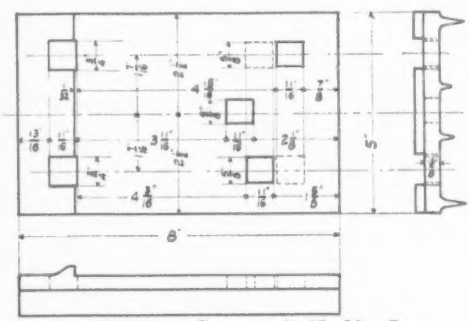
Michigan Central R R.



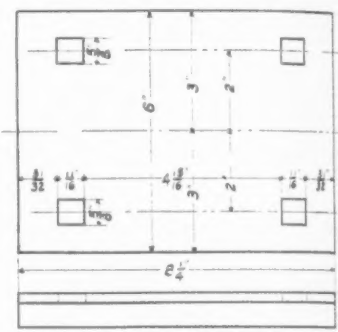
Flat Top Four Flange Plate for 80 lb. Rail Joint



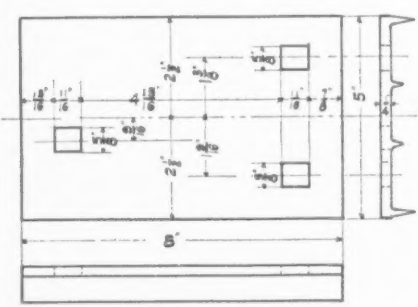
Flat Top Four Flange Plate for 60 Combination - Intermediate



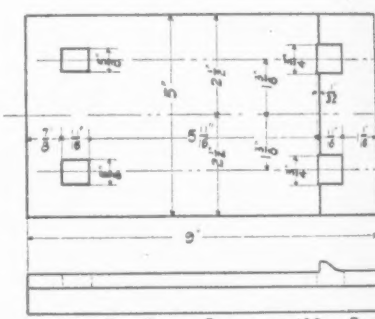
McKee Four Flange Plate for 60, 65 & 80 lb Rails Combination - Intermediate - Right & Left



Flat Top Four Flange Plate for 80 lb Rail Intermediate

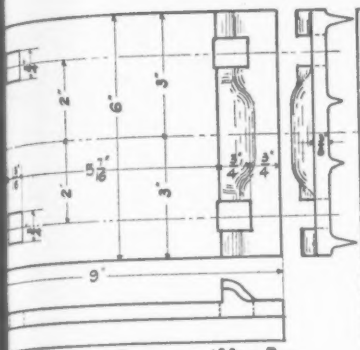


Flat Top Four Flange Plate for 80 lb. Rail. Crop End Joint

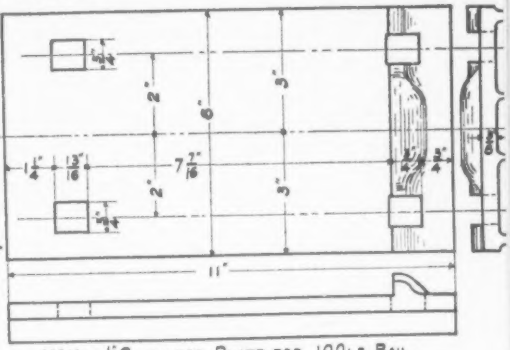


McKee Four Flange Plate for 100 lb. Rail Intermediate.

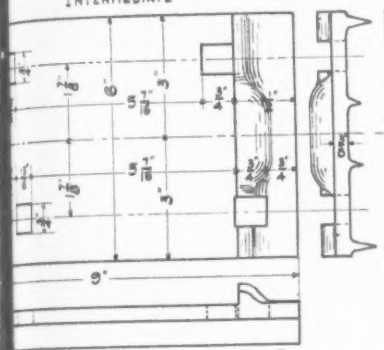
N.Y.C. & H.R.R.R.



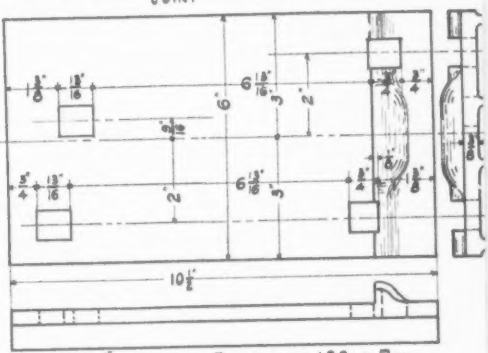
McKee ½" Shoulder Plate for 100 lb. Rail. Intermediate



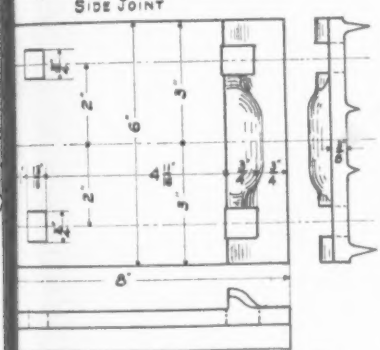
McKee ½" Shoulder Plate for 100 lb. Rail. Joint



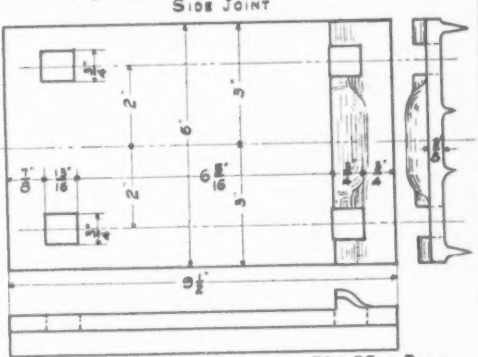
McKee ½" Shoulder Plate for 75 lb Rail Side Joint



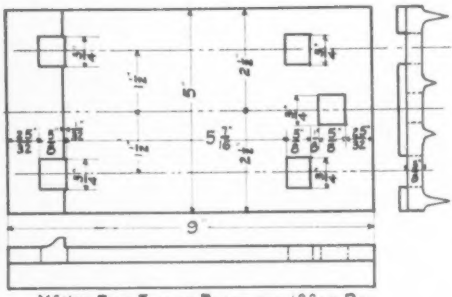
McKee ½" Shoulder Plate for 100 lb. Rail. Side Joint



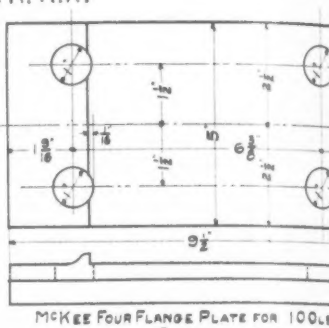
McKee ½" Shoulder Plate for 75 lb. Rail. Intermediate.



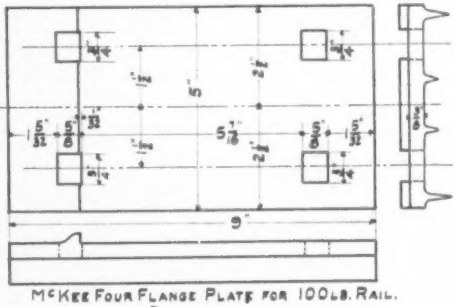
McKee ½" Shoulder Plate for 70 & 75 lb. Rails. Joint



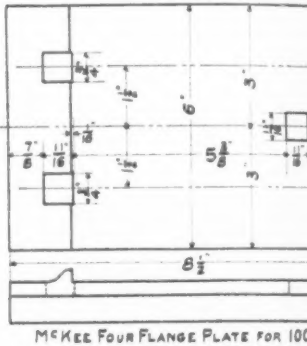
McKEE FOUR FLANGE PLATE FOR 100 LB RAIL JOINT.



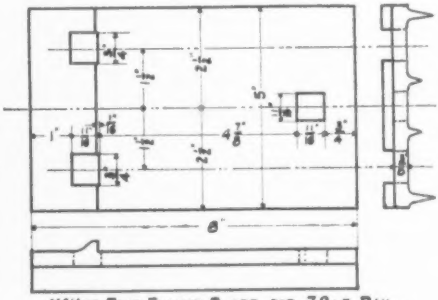
McKEE FOUR FLANGE PLATE FOR 100LB INTERMEDIATE.



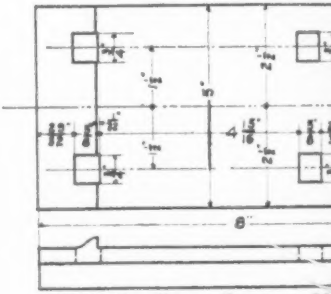
McKEE FOUR FLANGE PLATE FOR 100LB. RAIL. INTERMEDIATE.



McKEE FOUR FLANGE PLATE FOR 100 INTERMEDIATE.

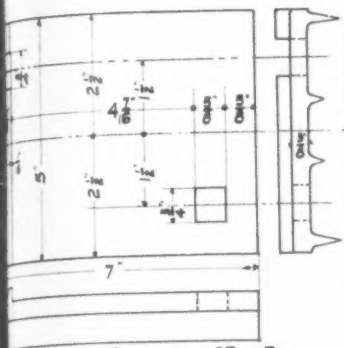


McKEE FOUR FLANGE PLATE FOR 78LB RAIL. INTERMEDIATE.

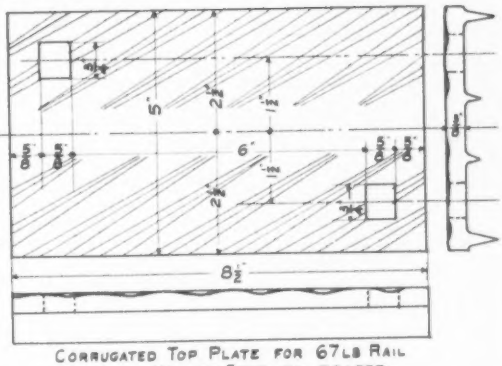


McKEE FOUR FLANGE PLATE FOR 80 INTERMEDIATE - JOINT.

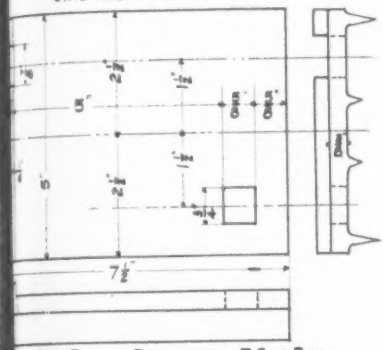
New York, Ontario & Western Ry.



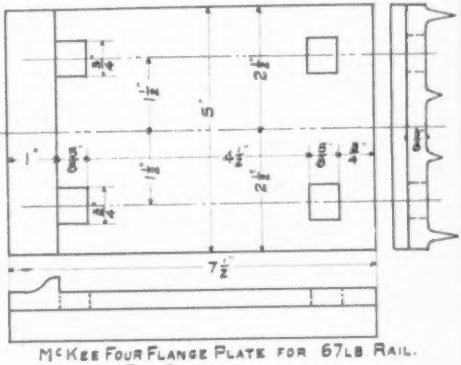
...ee Four Flange Plate for 67lb. Rail.
Intermediate. Right & Left.



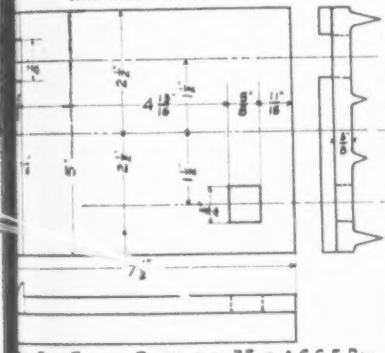
Corrugated Top Plate for 67lb Rail
Center Joint. Right & Left.



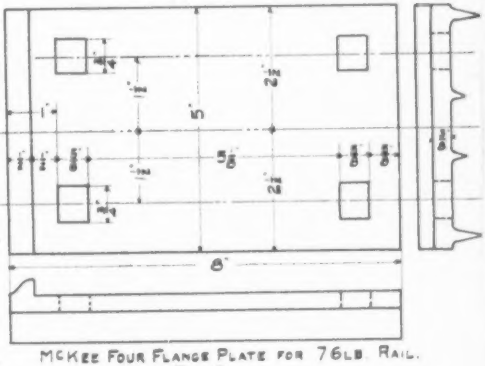
...Kee Four Flange Plate for 76lb Rail
Intermediate. Right & Left.



McKee Four Flange Plate for 67lb Rail.
End Joint.



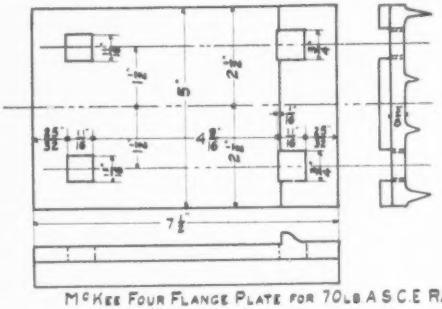
...ee Four Flange Plate for 75lb. A.S.C.E. Rail.
Intermediate. Right & Left.



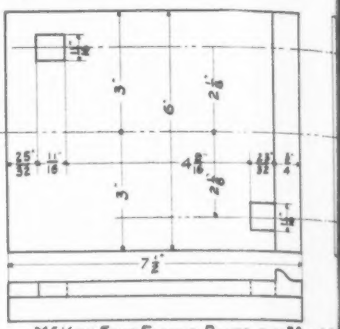
McKee Four Flange Plate for 76lb Rail.
End Joint.

1048

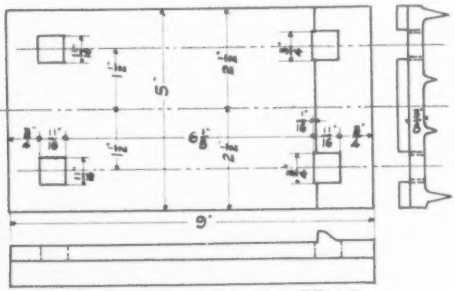
Pere Marquette R.R.



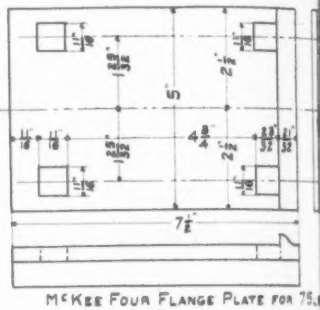
McKee Four Flange Plate for 70 lb A.S.C.E. Rail.
Intermediate.



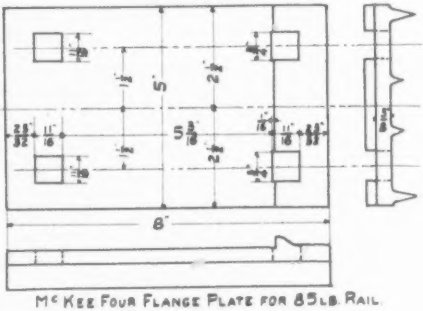
McKee Four Flange Plate for 70 lb A.S.
Joint.



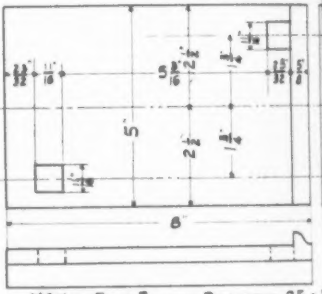
McKee Four Flange Plate for 75 lb. Rail.
Intermediate - Joint.



McKee Four Flange Plate for 75
Joint.

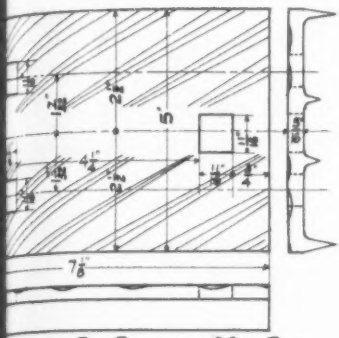


McKee Four Flange Plate for 85 lb. Rail.
Intermediate.

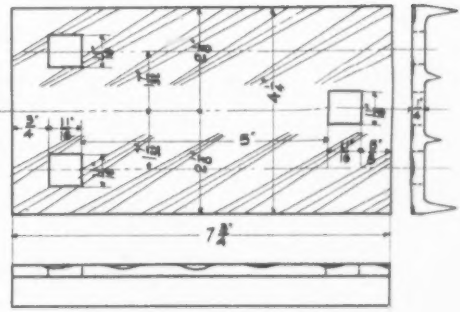


McKee Four Flange Plate for 85 lb
Joint.

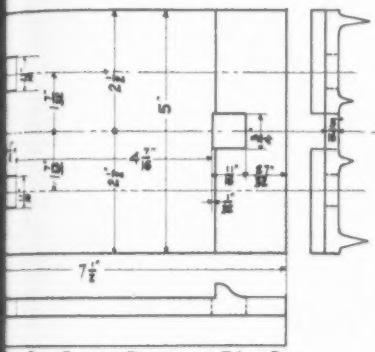
Seaboard Air Line Ry.



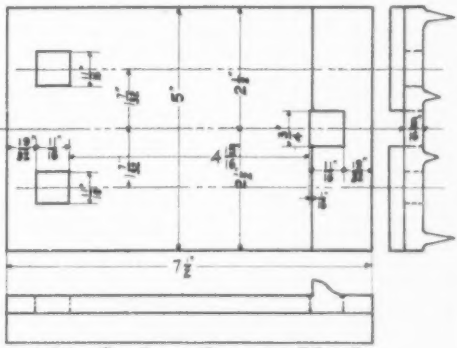
RRUGATED TOP PLATE FOR 60LB. RAIL.



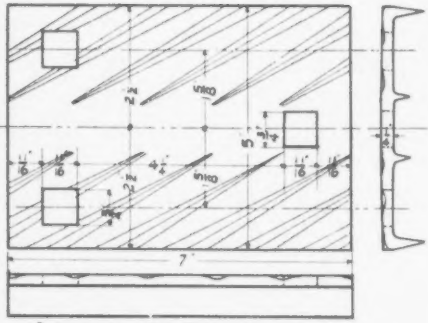
CORRUGATED TOP PLATE FOR 75LB. RAIL



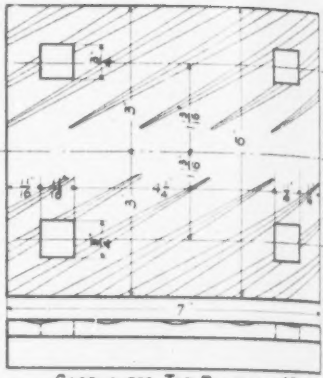
EE FOUR FLANGE PLATE FOR 70LB. RAIL



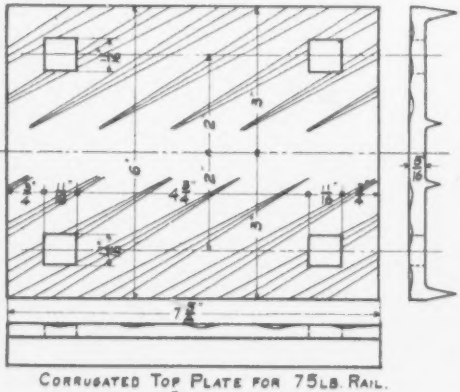
McKEE FOUR FLANGE PLATE FOR 75LB. RAIL.



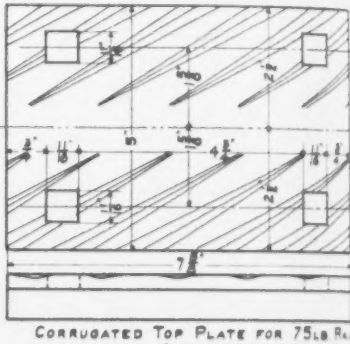
CORRUGATED TOP PLATE FOR 65LB RAIL.
INTERMEDIATE



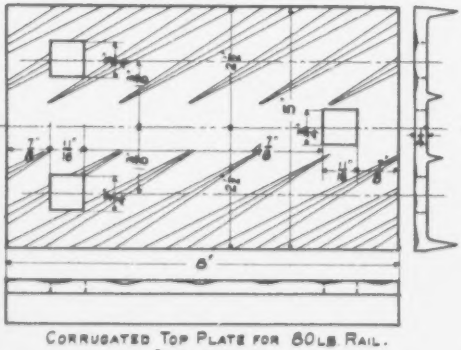
CORRUGATED TOP PLATE FOR 65LB R
JOINT.



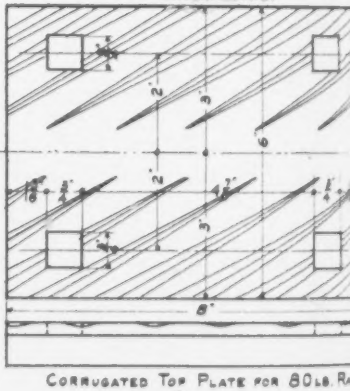
CORRUGATED TOP PLATE FOR 75LB. RAIL.
JOINT.



CORRUGATED TOP PLATE FOR 75LB RA
INTERMEDIATE.



CORRUGATED TOP PLATE FOR 80LB. RAIL.
INTERMEDIATE.

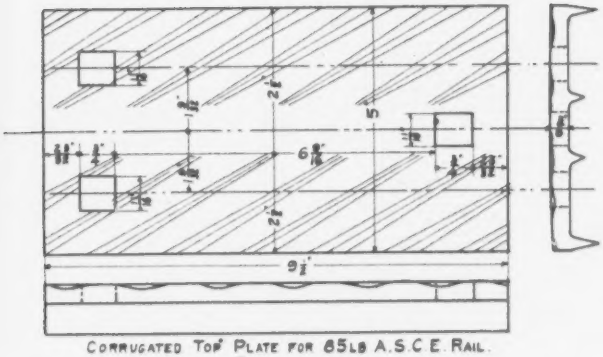


CORRUGATED TOP PLATE FOR 80LB. RA
JOINT.

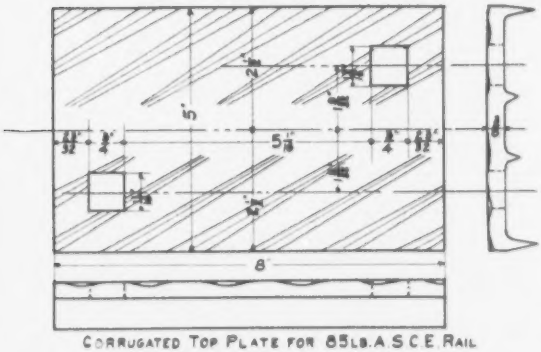
COPY ROUND C

1051

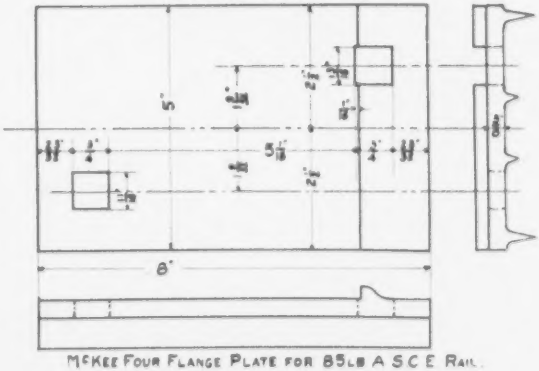
TIDEWATER RAILWAY.



CORRUGATED TOP PLATE FOR 85LB A.S.C.E. RAIL. JOINT.



CORRUGATED TOP PLATE FOR 85LB A.S.C.E. RAIL. INTERMEDIATE. RIGHT & LEFT.



MCKEE FOUR FLANGE PLATE FOR 85LB A.S.C.E. RAIL. INTERMEDIATE. RIGHT & LEFT.

OSE IN CENTER

1052

CORDAY & GROSS
PRINTERS DESIGNERS ENGRAVERS
CLEVELAND

(Here follows Exhibit WW, not reproduced.)

ndorsed:) Filed June 15, 1911, John H. R. Jamar, Clerk.

ıd on to-wit: the twenty-eighth day of December, 1911, there filed in the clerk's office of said court in said entitled cause a in Opinion in words and figures following to-wit.

Filed Dec. 28, 1911.

he Circuit Court of the United States for the Northern District of Illinois, Eastern Division.

No. 29294.

THE RAILROAD SUPPLY COMPANY
vs.
THE HART STEEL COMPANY and GUILFORD S. WOOD.

ILSAAT, *J.*:

Complainant seeks herein to restrain infringement of (1) claim 8 patent No. 538,809, granted May 7, 1895, to B. Wolhaupter; (2) ims 1, 2 and 3 of patent No. 691,322, granted January 14, 1902, same, and (3) claims 7 and 9 of patent No. 721,644, granted bruary 24, 1903, to same, all for railway tie plates. They read follows, viz:

"8. A railway tie-plate formed on the underside with devices, ore or less sharpened, adapted to penetrate and engage the tie d on its upper side with a series of flanges on which the rail rests, bstantially as described."

"1. A railway tie-plate provided on its upper side with one or ore flanges on which the rail may rest or by which it is directly stained and on the under side with one or more tie-engaging anges, extending parallel with the upper flanges and directly beeath the latter, substantially as described."

"2. A railway-tie plate provided on its upper side with one or ore flanges on which the rail may rest and by which it is directly stained and on the under side with one or more tie-engaging anges extending parallel with the upper flanges and directly beeath the latter and sharpened to permit them to readily enter the tie, substantially as described.

1638 "3. A railway-tie plate provided on its upper side with one or more flanges on which the rail may rest and by which t is directly sustained, on the under side with one or more sharpened tie-engaging flanges extending parallel with the upper flanges and directly beneath the latter, and on the upper side with an additional flange or flanges extending above the plane of the rail sustaining flanges and adapted to receive the lateral thrust of the rail, substantially as described."

"7. A tie-plate provided in its rail supporting surface with trans-

verse grooves or channels, and at one margin of said supporting su face with a transverse rail abutting shoulder.

"9. A tie-plate provided in its rail supporting surface with trans verse grooves or channels, reaching to the edge of the plate, and a one margin of said surface a transverse rail abutting shoulder.

In substance the subject-matters of the said several patents, s far as here involved, are as follows, viz:

Claim 8 aforesaid covers a tie-plate with more or less sharpene depending tie-engaging projections on its under side to supple ment the spikes, and having on its upper face a series of flanges o which the rail rests;

Claims 1, 2, and 3, aforesaid call for a tie-plate of the same ge eral construction as that of said claim 8, having on its lower under side tie-engaging projections parallel and in perpendicula alignment with the flanges in its upper surface, i. e., transverse t rail, and having an additional flange on one or both outside edg of its upper face, extending above the other flanges and parall therewith, and adapted to receive and resist the lateral thrust the rail;

Said claims 7 and 9 call for a tie-plate having grooves in its upp surface transverse the tie and extending to the outer edge of t plate, running parallel to the rail and provided at one margin its upper surface with a rail abutting shoulder extending parall to the rail.

Defendant is charged with the appropriation of the substan of each of the foregoing claims in the construction of the combin tion constituting its tie-plate, having the corrugated top surface a the more or less sharpened tie-engaging flanges of claim 8, the alig ment of the upper and lower flanges as in claims 1, 2, and 3 and t rail-abutting transverse shoulder of claims 7 and 9. Each of the elements, defendant insists, is found in the prior art. T
1639 defenses relied on are want of patentable novelty in view the state of the art, and non-infringement.

It is contended that the corrugated rail-supporting surface of t device of claim 8 presents a much longer-lived tie-plate than does t flat surfaced tie-plate which preceded it. That the furrowed surfa had some advantage over the flat rail supporting face, seems to fairly well established. It undertakes to make provision for the elim nation of moisture, which corrodes, and sand and other gritty s stances, which abrade, the tie-plate and tie, so that, for the purpo of this suit the utility of such a device must be conceded. The un tie-engaging flanges prevent movement of the plate upon the tie, a are concededly useful. Were further evidence of these facts ne sary, it may be found in the disclosure of the record with regard the use to which the device of the patents in suit has attained.

As a matter of first impression, it would seem as though the featu of the claims alleged to be novel could be little more than the re of mechanical skill—something that the railroad building art m suggest. They must, however, be viewed in the light of the art a stood at the time of the several alleged inventions in suit.

In the early days of railroading, engines and cars were light. R

ere laid upon and spiked into the ties or into wooden plates. As he weight and speed of trains and rail manufacturing facilities in-reased, it was found that this was not a safe or economical means or holding the rails in place. Flat plates of iron or steel construction ame into use. It is estimated that at the present day a first-class en-gine weighs more than ten times as much as did one of the first com-mercial engines. The great increase in traffic demanded increase in he carrying capacity of the cars. This in turn demanded the trengthening of the tracks. To this end, inventors have been active n devising, among numerous other track strengthening devices, tie-lates which should meet the demands of increased strain upon the racks and prevent as far as possible the destruction of railroad ties, he demand for the latter being such as to threaten the supply. hus it was that the pressure for improvement in tie-plates became ery great.

The specification in patent No. 538,809, aforesaid, (lines 13 to 49 ec., p. 1) reads as follows, viz.:

"Heretofore in the use of railway tie plates two general 1040 styles of plates have been employed. The plates were first put into use without top flanges, that is, flanges on the top of the plate against which the rail flange could abut and the late thereby be utilized to prevent the lateral movement of the rail nd consequent widening of the gage; but in the use of these smooth op plates it was found that the constant thrusts of the rail laterally ended to shear the spike and the latter had to be frequently re-ewed. To relieve the spike and obviate this item of renewals the late was provided with a top ridge or flange against which the rail lange could bear, the flanges on the under side of the plate which ngaged the tie supposedly holding the plate against any movement long the tie and the plate thereby relieving the spikes from the hearing action of the rail caused by its lateral thrust; but in the use f these plates with top flanges it has been found that the lateral hrust of the rail has caused the flanges on the under side of the late to break or compress the wood fibers and allow the late to creep along the tie longitudinally thereof. When the plate as once moved it has been practically impossible to again hold the op flange against the rail flange after the rail has been returned to s original and proper position, since the under flanges have no wood o abut against, the result being that even with the top flange on the late, the spike has had to take the thrust of the rail after the plate as been in use a short time, thus rendering useless this top flange nd soon shearing the spike."

From the record it appears that as to said claim 8, the prior art is, ubstantially, to be found in the following patents:

The railway chair of Wells patent No. 203,570, granted May 14, 878, disclosing a device having an underneath rectangular shaped rojection or flange intended to be sunk in a channel cut into the tie nd upper flanges upon which the rail rests, the grooves of which erve to lighten the device and afford protection from grit and oisture. This chair is meant to hold the ends of the rails. It ex-ends over several ties. Complainant insists the chair is not in the tie-

plate art. So far, however, as it makes public features bearing
claims in suit, aforesaid, it will be proper to consider it;

Hudson patent No. 142,020, granted August 19, 1873,
discloses a tie-plate with a channel on its upper face arran
receive a flange in the bottom of the rail, shoulders
1641 outer edge of the upper face, embracing the rail-b
both edges and a rectangular projection or flange
under side directly beneath its upper channel, designed t
vent shearing of the spikes and creeping of the plate;

Gould patent No. 280,030, granted June 26, 1883, for ra
plate provided with two or more V-shaped metal flanges or
in its under side, which will readily be imbedded in the ti
which has one or more longitudinal grooves on its top o
surface to receive corresponding ribs or flanges on the bott
the rail and on one edge a shoulder. A rubber cushion is pr
on the under side, between the grooves or flanges;

Dunham patent No. 469,386, granted February 23, 1892,
shows a corrugated tie-plate, both sides or faces being corrug
thus providing for protection against moisture and sand;

Goldie patent, No. 485,030, granted October 25, 1892, for
plate. This device has a slightly concave top face centrally l
and a convex under face. The base of the rail rests practica
the plain surface at the sides of the depression, leaving an o
under and parallel to the rail. There are more or less shar
flanges on the under side which penetrate the rail. A sh
extending across the plate near one edge of the top surface
side thrust. While not mentioned in the patent, it is eviden
this tie-plate will take care of moisture and grit:

Servis patent, No. 249,407, granted November 8, 1881, r
10302, reissued April 3, 1883, and No. 294,816, granted Mar
1884, for a wear plate, all show tie-plates having flanges on
under faces and flat upper faces;

In Reece patent No. 494,692, granted April 4, 1893, is sh
tie-plate which has more or less sharpened flanges on its
face and portions upon its upper face equivalent to raised ribs
which the rail rests and also, rail abutting shoulders. Th
tions upon which the rail rests are produced by cutting o
metal from a plane top face, so as to leave ribs or strips of
with openings through to the tie, as in fig. 2 of the patent;

Holmes patent No. 495,807, granted April 18, 1893, show
stantially the same tie-plate without the openings;

The patent to Churchward, granted November 7, 1893
numbered 508,086, calls for a wear plate for railroad ties,
a flat rail supporting surface flanked by two trans
1642 ranging rail abutting shoulders and an under-surfac
vided with transversely ranging and sharpened, tie-en
ribs or flanges;

Worthington patent, No. 506, granted October 17, 189
method of making railroad tie-plates, shows a plate formed
longitudinal ribs on both of its faces and then planing or
away parallel sections of the ribs upon one face of the pl

form the seat and abutments for the foot flange of the rail." This device as first prepared and before cutting away, is the device of claim 8 and claims 1 and 2 aforesaid;

Avery patent, No. 574,773, granted January 5, 1897, for a railway tie-plate, covers a device which has rail-supporting ribs on its upper face connected near their ends by transverse raised portions or narrow ribs, thereby forming a trough between each set of supporting ribs. At the bottom of this trough, and adjoining the inner face of the transverse end ribs, a tongue of metal is cut and turned down, thereby constituting downward projecting teeth, which engage the tie much as shown in Wolhaupter patent No. 579,509, fig. 2, granted March 23, 1897. When the tie-plates are cast, the tie-engaging "tongues are cast integral with the plate." One object of this construction, it is stated, is to prevent the entrance of water and dirt between the plate and the tie. The troughs above referred to must be completely covered by the bottom flange of the rail in order to exclude moisture and grit. At line 41, p. 2, it is said: "A boss or lug E, or two lugs, may be formed on the top of one or more of the ribs to serve as abutments for the rail flange and prevent its lateral movement. These lugs may be pressed upward if the plate is made of wrought metal, or may be cast on, if made of cast metal." The lugs serve the same purpose as a shoulder.

Various other patents, such as Reece patent No. 488,662, for wear plate; Clark patent, No. 529,854, granted November 27, 1894; Reece patent, No. 541,984, granted July 2, 1895; Churchward patent, No. 492,528, granted February 28, 1893, for a wear plate, having sharpened under flanges and a plain upper face with a shoulder; patent No. 506,963, granted to Worthington for making tie-plates, October 17, 1893; Holmes patent, No. 514,465, granted February 13, 1894, for a tie-plate; patent to Clark, No. 529,854, granted November 27, 1894, for a tie-plate and others, together with certain publications, disclose devices more or less resembling those in suit.

1643 From the foregoing, it appears that tie-plates having flanged under faces more or less sharpened to engage the tie, were old when claim 8 was applied for; also that devices having flat tops, except a rail abutting shoulder, and more or less sharpened under flanges, were also old; that tie-plates having channels and attendant flanges, or projections and shoulders on their upper faces, and rectangular projections or flanges on their under side were old.

The device of claim 8 differs from the device of the Dunham patent only in its under flanges being more or less sharpened.

It also appears that tie-plates having upper and lower flanges, both parallel with the rail and those transverse thereto were old. In the Goldie patent, the depression made in the center of the plate is alleged by the patentee to be for the purpose of receiving the more or less rounded portion of the center of the rail foot or base. Fig. 2, shows a clear opening under the rail base, with the flanges of the base resting on those parts of the tie-plate not included in the concave center but immediately adjacent to and upon both sides of such center depression. The effect of this would be

SE IN CENTER

to provide flanges on the upper face of the tie-plate upon
the rail rests. As said above, Goldie lays no claim to this f
of his device. As a witness for complainant he pronounc
device a failure. Inasmuch as his device has gone to the g
public by expiration of his patent, his statement cannot pre
an admission. The space under the rail in fig. 2 would be
for the collection and removal of moisture and grit from the
It is apparent that the bearing rib or section of this tie-plate is
and in vertic*le* alignment with the more or less sharpened
on the under face of the plate, as in the second patent in s
that if the Goldie depression is equivalent to the channels
produce the rail bearing flanges of claim 8, then, whether c
or not, by Goldie, Wolhaupter was not the first to discover
plate formed on the under side with devices, more or less shar
adapted to penetrate and engage the tie, and on its upper sid
a series of flanges on which the rail rests" substantially as des
in the first patent in suit. The alleged object of the dev
claim 8 is to prevent lightness, cheapness, strength, protection
moisture and grit, and to prevent creeping of the plate.
these are secured in the Reece patent above set out.

1644 Such being the state of the art, complainant's inve
as disclosed in claim 8, must be limited to the part
form of tie-plate shown in the drawings with only a very li
right to equivalents, if any. Under the state of the art, there
be no novelty in extending the lower flanges parallel with the
of the tie. Goldie, Dunham, Reese, and others have the sa
rangement. Wolhaupter prefers his plate formed into a t
shape, but does not limit himself to that form. He claims a
plate, since each point where the rail rests upon the plate, i
ported and trussed by metal which is more or less on ed
stead of on its side, thereby forming for each resting point
rail, two girders C[7] joined at the apex by the top flanges C[4]
the rail rests."

If the device of claim 8 is to be compared separately wi
fendant's alleged infringing tie-plate, it is evident that the
lacks the under side flanges formed so as to give an arch ef
support to the tie-plate. Its under face is flat with V-shap
pending projections in more or less perpendicular alignment
the upper face raised portion thereof. Its upper flanges, if
may be so termed, run parallel to the rail and transverse the
do its under flanges. While those of claim 8 run transverse t
and parallel to the grain of the tie, other differences are dis
so that were the two to be placed in conflict infringement wou
be deemed established, in view of the state of the art.

Compared with claims 1, 2, and 3, of patent No. 691,332,
be seen that the under flanges of defendant are located with
to the upper rail rests, the same as in Goldie, Reece, and
haupter, provided the upper rail rests may be termed flan
Reece and Goldie. Defendant's shoulder is that of Goldie, w
the shoulder device of claim 3 is practically that of Ree
lacks also the punched out teeth of Wolhaupter as shown

specification. Were these two devices here in suit alone, infringement could not be decreed in view of the condition of the art at date of patent.

Considering defendant's device in comparison with claims 7 and 9 of patent No. 721,644, it appears that it comes so far as the said claims go within the language thereof. It has the transverse grooves reaching to the edge of the plate on its rail-supporting sur-
1645 face and also the transverse rail-abutting flange. As above stated, the only improvement of claims 7 and 9 deemed necessary to consider here is the rail-abutting shoulder. The language of these claims is broad enough to include any tie-plate having such a shoulder in connection with grooves on its upper face. Patent to the same Wolhaupter, No. 579,509, aforesaid shows substantially this same arrangement of grooves on the upper face of a railroad tie-plate in combination with a shoulder or rail-abutting flange. It is found in Goldie patent aforesaid. If it is to be construed so as to include defendant's tie-plate, it must be held invalid. This, however, is not necessary. There seem to be few lines of the inventive art which have been so diligently followed up as the tie-plate. The minutest advances have been recognized by the patent office. It is, therefore not deemed necessary to hold this third patent invalid, for what it calls for as limited by the prior art.

It is the judgment of the court that defendant's device does not infringe any of the claims in suit in view of the state of the art. The bill will, therefore, be dismissed for want of equity.

Dec. 28, 1911.

(Endorsed:) Filed Dec. 28, 1911. John H. R. Jamar, Clerk.

And on to-wit: the twenty-eighth day of December, being one of the days of the regular December 1911, term of said court, in the record of proceedings thereof in said entitled cause before the Hon. Christian C. Kohlsaat, Circuit Judge, appears the following entry to-wit:

29294.

THE RAILROAD SUPPLY COMPANY
vs.
THE HART STEEL COMPANY and GUILFORD S. WOOD.

This cause *coming* on to be heard, upon pleadings, proofs, exhibits and briefs, filed by both parties, and was argued by Taylor E. Brown, Esq., and C. C. Linthicum, Esq., counsel for complainant, and Frank F. Reed, Esq. and Frederick P. Fish, Esq., counsel for defendants, on Thursday, June 15th, 1911, and taken under advisement by the Court, and the Court being duly advised in the premises, and having this day filed a written opinion it is hereby
1646 Ordered, Adjudged and Decreed as follows:—

I. That the Bill of Complaint is hereby dismissed at complainant's costs for want of equity.

II. That such models and exhibits filed herein, as may be also entitled and required for use in the case of this complainant vs. The Elyria Iron & Steel Company, pending in the United States Circuit Court for the Eastern Division of the Northern District of Ohio, may be withdrawn from the files of this court by the counsel introducing the same, upon the understanding that said exhibits and models shall be produced by counsel withdrawing the same, for any subsequent proceedings in this cause in this Court or the United States Circuit Court of Appeals.

And on the same day to-wit: the twenty-eighth day of December, 1911, come the complainant in said entitled causce by its solicitor and filed in the Clerk's office of said Court its certain Petition for Appeal in words and figures following to-wit:

Petition for Appeal.

In the United States Circuit Court for the Eastern Division of the Northern District of Illinois.

In Chancery. 29294.

THE RAILROAD SUPPLY COMPANY, Complainant,

vs.

THE HART STEEL COMPANY and GUILFORD S. WOOD, Defendants.

Petition for Appeal.

To the Honorable the Judges of the Circuit Court of the United States in and for the Eastern Division of the Northern District of Illinois, in Chancery Sitting:

The above named complainant, The Railroad Supply Company conceiving itself aggrieved by the final Order and Decree
1647 made and entered in the above-entitled cause on the 28th day of December, 1911, dismissing its bill of complainant herein for want of equity at complainant's costs, does hereby appeal from the said order and decree to the United States Circuit Court of Appeals for the Seventh Circuit, for the reasons specified in the assignment of errors, which is filed herewith, and prays that a Citation be granted directed to the above named defendants, The Hart Steel Company and Guilford S. Wood, commanding them and each of them to be and appear before the United States Circuit Court of Appeals for the Seventh Circuit to do and receive what may appertain to justice to be done in the premises; and prays that a transcript of the record proceedings and papers upon which said Order and decree was made, and also that all models and exhibits filed in

cause, may be duly authenticated and sent to the United States uit Court of Appeals for the Seventh Circuit.
hicago, Illinois, December 28, 1911.

THE RAILROAD SUPPLY COMPANY,
By TAYLOR E. BROWN, *Its Solicitor.*

AYLOR E. BROWN,
C. LINTHICUM,
CLARENCE POOLE,
Of Counsel for Complainant.

(Endorsed:) Filed Dec. 28, 1911. John H. R. Jamar, Clerk.

And on the same day to-wit: the twenty-eighth day of December, 11, come the complainant in said entitled cause by its solicitor filed in the clerk's office of said court its certain assignment of ors in words and figures following to-wit:

48 *Assignment of Errors.*

Filed Dec. 28, 1911.

the United States Circuit Court for the Eastern Division of the Northern District of Illinois.

In Chancery. No. 29294.

THE RAILROAD SUPPLY COMPANY, Complainant,
vs.
E HART STEEL COMPANY and GUILFORD S. WOOD, Defendants.

Assignment of Errors.

And now comes The Railroad Supply Company, the above-named mplainant, by Taylor E. Brown, C. C. Linthicum and C. Clarence ole, its solicitors and counsel, and says that the final Order and ecree entered herein on the 28th day of December, A. D. 1911, smissing its bill of complaint for want of equity at complainant's sts, is erroneous and against the just rights of the complainant; d that the said Circuit Court of the United States for the Eastern ivision of the Northern District of Illinois, erred in entering said der and Decree for reasons, as follows:

I. That the said Circuit Court erred in dismissing said Bill of mplaint at complainant's costs or otherwise, for want of equity, on other grounds.

II. That the said Circuit Court erred in limiting the scope of claim of Wolhaupter Letters Patent No. 538,809 of May 8, 1895, and of aims 1, 2 and 3 of Wolhaupter Letters Patent No. 691,332 of nuary 14, 1902, and of claims 7 and 9 of Wolhaupter Letters atent No. 721,644, of February 24, 1903, by reason of the prior

state of the art, and in holding that as thus limited, the defendants' tie plates did not infringe either of said claims.

III. That the said Circuit Court erred in not holding the defendants' tie plate complained of, to embody the invention of claim 8 of said Wolhaupter Letters Patent No. 538,809, and of claims 1, 2, and 3 of said Wolhaupter Letters Patent No. 691,332, and of
1649 claims 7 and 9 of said Wolhaupter Letters Patent No. 721,644, and to constitute an infringement thereof.

IV. That the said Circuit Court erred in not granting an injunction against the defendants, in not referring the cause to a Master for an accounting, and in refusing to grant any substantial relief to the complainant, as prayed for in and by its said Bill of Complaint.

Wherefore, the said The Railroad Supply Company, complainant in said cause, prays that the aforesaid final Order and Decree in the Circuit Court of the United States for the Eastern Division of the Northern District of Illinois, may be reversed, and that the said Circuit Court be directed by the mandate of the United States Circuit Court of Appeals for the Seventh Circuit to enter an order and decree in favor of the complainant, in conformity with the prayer of its Bill of Complaint for an injunction and an accounting, and to grant such other and further relief to the complainant as may seem just and proper.

Chicago, Illinois, December 28, 1911.

THE RAILROAD SUPPLY COMPANY,
By TAYLOR E. BROWN, *Its Solicitor.*

TAYLOR E. BROWN,
C. C. LINTHICUM,
C. CLARENCE POOLE,
Of Counsel for Complainant.

(Endorsed:) Filed Dec. 28, 1911. John H. R. Jamar, Clerk.

And on the same day to-wit: the twenty-eighth day of December, being one of the days of the regular December 1911, term of said court, in the record of proceedings thereof in said entitled cause before the Hon. Christian C. Kohlsaat, Circuit Judge, appears the following entry to-wit:

1650 *Order of Dec.* 28, 1911.

29294.

THE RAILROAD SUPPLY COMPANY
vs.
THE HART STEEL COMPANY and GUILFORD S. WOOD.

And now, upon the filing herein *of* the above-named complainant, The Railroad Supply Company, of a petition for an Order allowing an appeal, together with assignment of errors, and upon

ion of Taylor E. Brown, Esq., solicitor for the complainant, the court being duly advised in the premises, it is hereby

rdered:

. That an appeal be, and the same is hereby allowed in the ited States Circuit Court of Appeals for the Seventh Circuit, m the final decree or order entered herein on the 28th day of cember, 1911, dismissing complainant's bill of complaint for nt of equity at complainant's costs.

II. That the amount of the bond upon appeal be, and the same hereby fixed at two hundred and fifty dollars, ($250.00).

III. That upon the filing of said appeal bond with surety to be proved by the clerk, the same shall act as a supersedias to stay e collection of costs in this Court pending the determination of is appeal; and

IV. That a transcript of the record, proceedings and papers erein, together with all models and exhibits filed, shall be duly rtified by the clerk and forthwith transmitted to the United States ircuit Court of Appeals for the Seventh Circuit.

And afterwards to-wit: on the twenty-ninth day of December, 911, come the complainant in said entitled cause and filed in he clerk's office of said court its certain Bond on Appeal in words nd figures following to-wit:

651 *Bond on Appeal.*

Filed Dec. 29, 1911.

In the United States Circuit Court for the Eastern Division of the Northern District of Illinois.

In Chancery. No. 29294.

THE RAILROAD SUPPLY COMPANY, Complainant,
vs.
THE HART STEEL COMPANY and GUILFORD S. WOOD, Defendants.

Bond on Appeal.

Know All Men by these Presents, that we, The Railroad Supply Company, a Corporation organized and existing under and by virtue of the laws of the State of Illinois, and the Illinois Surety Company, as surety, are held and firmly bound unto The Hart Steel Company and Guilford S. Wood, the above named defendants in the full and just sum of two hundred and fifty dollars ($250.00) to be paid to the said The Hart Steel Company and Guilford S. Wood, their attorneys, successors or assigns, to which payment well and truly to be made, we bind ourselves, our successors, assigns and legal representatives, jointly and severally by these presents. Sealed with our seals and dated this 29th day of December, A. D. 1911.

Whereas, at a hearing in the Circuit Court of the United
for the Eastern Division of the Northern District of Illinois
suit depending in said Court between the said The Railroad S
Company, as complainant, and The Hart Steel Company and
ford S. Wood, as defendants, a final decree was rendered on th
day of December, 1911, against said complainant dismissi
bill of complaint for want of equity at complainant's costs; a
said The Railroad Supply Company, having obtained an
allowing an appeal, and filed a copy thereof in the clerk's of
said court, to reverse the decree in the aforesaid suit, and h
obtained a citation directed to the said The Hart Steel Com
and Guilford S. Wood to be and appear at a United
1652 Circuit Court of Appeals for the Seventh Circuit to be h
at the city of Chicago within thirty (30) days from th
hereof;

Now, the condition of the above obligation is such that
said The Railroad Supply Company, shall prosecute its said a
to effect and answer to damages and costs if it failed to ma
appeal good, then the above obligation to be void, else to rema
full force and effect.

THE RAILROAD SUPPLY
COMPANY,
[CORPORATE SEAL.] By PAUL W. KOHNEN, *Secreta*
THE ILLINOIS SURETY
COMPANY,
[CORPORATE SEAL.] By JAMES S. HOPKINS,
Acting Preside

Attest:
CHAS. E. SCHICK, *Secretary.*

(Endorsed:) Filed Dec. 29, 1911. John H. R. Jamar, Cle

And on to-wit, the thirtieth day of December, 1911, there was
in the clerk's office of said court in said entitled cause a certain s
lation in words and figures following to-wit:

1653 *Stipulation.*

Filed Dec. 30, 1911.

In the United States Circuit Court for the Eastern Division o
Northern District of Illinois.

In Chancery. No. 29294.

THE RAILROAD SUPPLY COMPANY, Complainant,
vs.
THE HART STEEL COMPANY and GUILFORD S. WOOD.

Stipulation.

It is hereby stipulated by and between the above named p
by their respective counsel that all models and paper exhibi

produced by either party and not physically contained in either of the bound volumes entitled,

1. "Complainant's Pleadings and Proofs."
2. "Answer, Amendment to Answer and Evidence of Defendants."
3. "Defendants' Exhibits."

shall be certified and delivered to the Clerk of the Court of Appeals; shall be treated for all purposes of the appeal as Physical or Mechanical Exhibits, shall not be included in the transcript of the Record and shall not be reproduced or reprinted (where same are capable of reproduction) by the Clerk of the United States Circuit Court of Appeals for the Seventh Circuit.

Chicago, Illinois, December 30th, 1911.

TAYLOR E. BROWN,
Solicitor and of Counsel for Defendants.
F. F. REED,
Solicitor for Complainant.

(Endorsed:) Filed Dec. 30, 1911. John H. R. Jamar, Clerk.

1654 And on to-wit: the thirtieth day of December, 1911, come the complainant in said entitled cause by its solicitor and filed in the clerk's office of said court its certain Præcipe for Record in words and figures following to-wit:

Præcipe.

In the United States Circuit Court for the Eastern Division of the Northern District of Illinois.

In Chancery. No. 29294.

THE RAILROAD SUPPLY COMPANY, Complainant,
vs.
THE HART STEEL COMPANY and GUILFORD S. WOOD, Defendants.

Præcipe.

To John H. R. Jamar, Esq., Clerk of said Court, Chicago, Illinois:

SIR: You will please prepare immediately a Transcript of the Record in the above entitled cause for the Appeal prayed and allowed on the 28th day of December, 1911, to embrace one copy of each of the following documents, to-wit:

1. The printed volume of 822 pages and of 35 pages of printed exhibits, two catalogues, Exhibits 21 and 22, Bell Process patent, Exhibit No. 175, and XIII pages of index, all bound together and entitled "Complainant's Pleadings and Proofs."

2. The printed volume of 454 pages and VI pages of index bound together and entitled as "Answer, Amendment to Answer and Evidence of Defendants."

3. The Opinion of his Honor, Judge C. C. Kohlsaat, U. S. Circuit Judge, filed December 28, 1911.

4. The Final Decree dismissing Bill of Complaint, entered December 28th, 1911.

5. The Petition for Appeal filed December 28th, 1911.

6. The Assignment of Errors filed December 28th, 1911.

7. The Order allowing the appeal entered December 28th, 1911.

1655 8. The Citation and acknowledgment of service filed December 28th, 1911.

9. The Bond on Appeal filed December 29th, 1911.

10. One book of 73 U. S. Patents, 10 blue prints and three catalogues, all bound together and entitled "Defendants' "Exhibits."

11. Stipulation of counsel as to treating certain documents as "Mechanical Exhibits" dated and filed December 30th, 1911.

12. Certify to Clerk of U. S. Circuit Court of Appeals all exhibits not contained in the printed volumes aforesaid, and then deliver to said clerk all of said exhibits and all models not withdrawn by counsel under the terms of the decree.

13. A copy of this Præcipe.

Chicago, Illinois, December 30th, 1911.

TAYLOR E. BROWN,
Solicitor and of Counsel for Complainant.

(Endorsed:) Filed Dec. 30, 1911. John H. R. Jamar, Clerk.

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EXHIBIT S.

KATE S. HOLMES,
Notary Public.

1068

J. E. WOOTTEN.

RAILWAY CHAIR.

No. 66,437. Patented July 2, 1867.

Fig: 1.

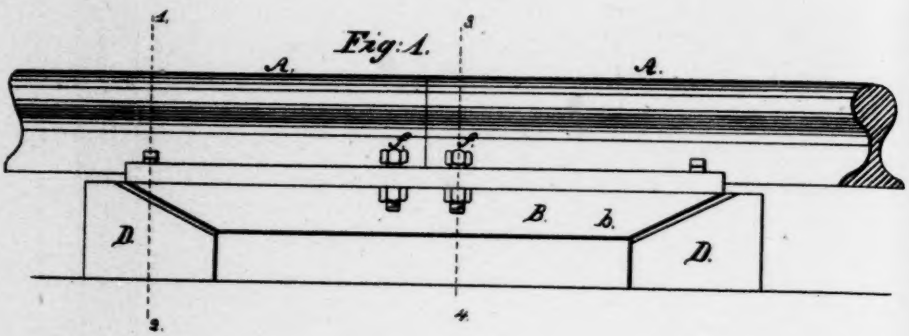


Fig: 2

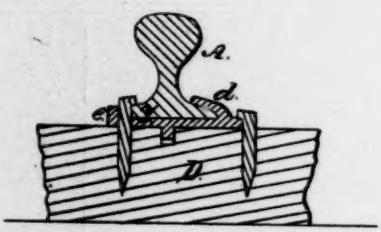


Fig: 3.

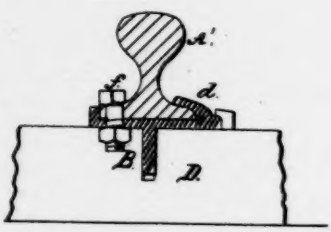
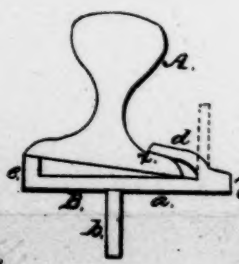


Fig: 4.



Witnesses:

Wm Albert Stubb

S. N. Hoxie Godwin

Inventor:

J. E. Wootten

By his Atty

H. Howson

United States Patent Office.

J. E. WOOTTEN, OF READING, PENNSYLVANIA, ASSIGNOR TO HIMSELF, C E. BYERS, AND W WHARTON, JR.

Letters Patent No. 66,437, *dated July* 2, 1867.

IMPROVED RAILWAY-CHAIR.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, J. E. WOOTTEN, of Reading, Berks county, Pennsylvania, have invented an improved Rail-Supporting Coupling; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention consists of a rail-coupling composed of a rolled bar with retaining flange and certain ribs, the whole being supported at its opposite ends on two sleepers, and being constructed for the retention, support, and ready removal and replacing of the rails, substantially as described hereafter.

In order to enable others skilled in the art to make and apply my invention, I will now proceed to describe its construction and operation, reference being had to the accompanying drawing, which forms a part of this specification, and in which—

Figure 1 is a side view of my improved rail-supporting coupling.

Figure 2, a transverse vertical section on the line 1–2, fig. 1.

Figure 3, a transverse vertical section on the line 3–4, fig. 1; and

Figure 4, a sectional view, drawn to an enlarged scale, and illustrating the mode of removing and replacing the rails.

Similar letters refer to similar parts throughout the several views.

A and A′ represent the adjacent ends of two ordinary rails, and B the supporting coupling for the same. The peculiar construction of this coupling will be best observed on reference to the enlarged view, fig. 4. It consists of the plate *a*, on the under side of which is a rib, *b*, and on the upper side the bent retaining flange *d* at one edge, and longitudinal rib *e* at the other, the whole being in one piece. A long bar, with ribs *e* and *b*, and the flange *d* in a vertical position, shown in dotted lines, fig. 4, is first rolled, the said flange *d* being subsequently bent down, by passing the bar through appropriate grooves in the rolls. From this bar are cut the rail-supporting couplings B, of appropriate length, the ends of the under rib *b* being bevelled, as shown in fig. 1. D and D′ are the two sleepers, on which the coupling rests, and these are so cut away as to admit the bevelled ends of the rib *b*, and permit the flat or horizontal portion of the coupling to rest fairly on the said sleepers. The two ends of the rails A and A′ are now introduced to the coupling, by placing their flanges *x* beneath the bent retaining flange *d*, as seen in fig. 4, and pushing the rails laterally until they rest on the upper surface of the horizontal portion *a* of the coupling, when they are confined laterally between the bent flange *d* and rib *e*. Spikes *e* are now driven through holes in the coupling, one or more near each end of the same, and through recesses in the flange *y* of the rails into the sleeper, and bolts or rivets *f f* are passed through holes in the flanges *y* of the rails, and through the coupling, thereby securing the latter firmly to the former. It will be seen that the coupling resting on the sleepers at each end, serves as a rigid girder to support the ends of the two rails, and to resist any strain to which the rails may be subjected; at the same time the coupling serves to effectually retain the rails in the proper lateral position.

So securely is the coupling confined to the two rails that it may be considered a part of the same. Even should one of the sleepers be depressed below its proper level, the two rails would still be retained in line, owing to the bent retaining flange above and rib below the coupling. The removal of the rail is a matter readily accomplished, without the necessity of moving either the rail or the coupling laterally, for after the spikes *e e* have been withdrawn, and the bolts or rivets removed, the rails may be first tilted to the position shown in fig. 4, and the flanges *x* then withdrawn from the retaining flange *d*.

I am aware that a rail-supporting coupling, consisting of a rolled bar, having a rib at the under side, and a bent flange at each edge, is described in the application of George W. Billings, withdrawn in 1861; such a coupling, however, is objectionable, as a rail cannot be detached from the same without moving either the rail or the coupling longitudinally, a difficult and tedious operation.

I claim as my invention, and desire to secure by Letters Patent—

The rolled bar B, with its under rib *b*, side rib *e*, and bent flange *d*, when the said ribs are constructed and arranged as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

J. E. WOOTTEN.

Witnesses:

JOHN WHITE,

W. J. R. DELANY.

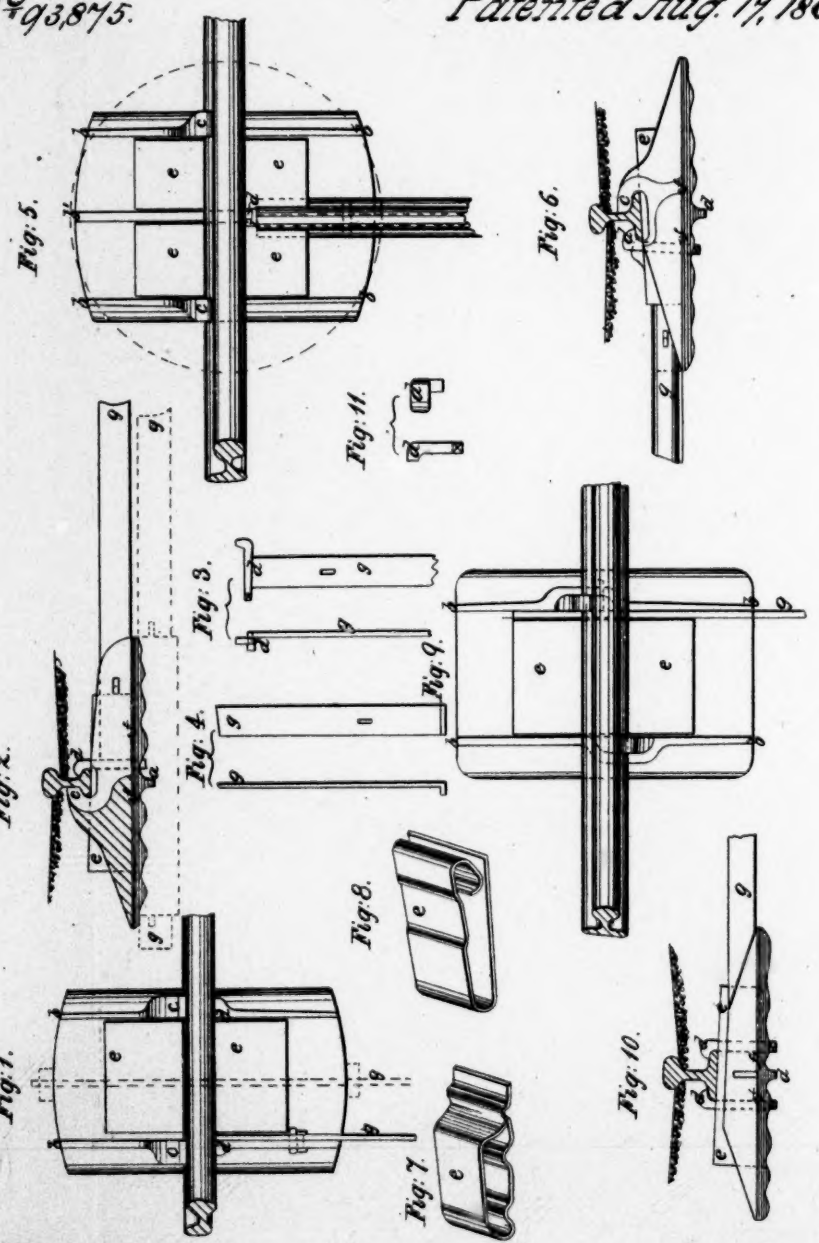
1661 & 1662 Ex. S1.

KATE S. HOLMES,
Notary Public.

Sheet 1, 2 Sheets.

J. Gregory.
R. R. Chairs.

No. 93,875. Patented Aug. 17, 1869.



Witnesses:

J. C. Newburn
172 Fleet Street London
H. Baker 172 Fleet Street London

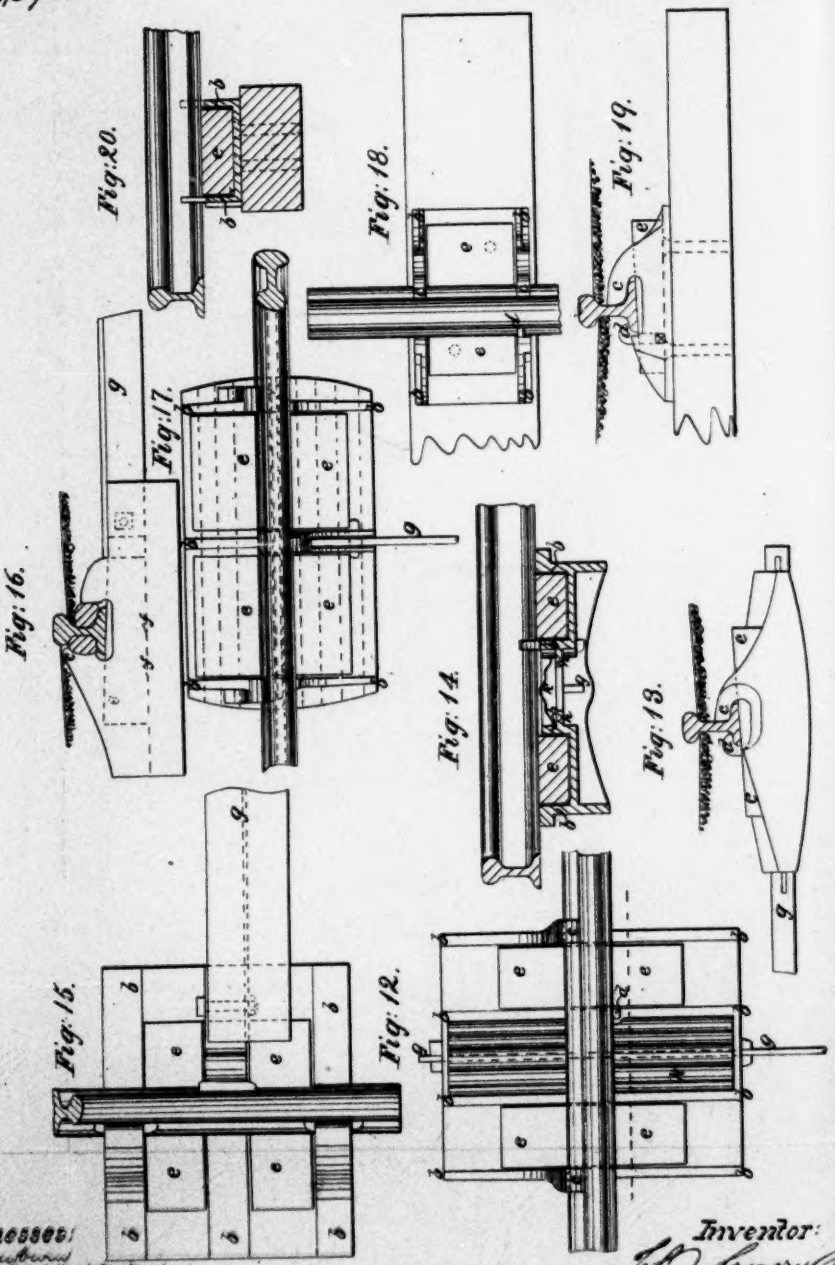
Inventor:

John Gregory

Sheet 2, 2 Sheets.

J. Gregory
R. R. Chairs.

No. 93,875. Patented Aug. 17, 1869.



Witnesses:
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72 Chancery Lane London
A. Bagley
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London

Inventor:
John Gregory

United States Patent Office.

JOHN GREGORY, OF LISBON, PORTUGAL.

Letters Patent No. 93,875, *dated August* 17, 1869; *patented in England, October* 28, 1868.

IMPROVED RAILWAY-CHAIR AND SLEEPER.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, JOHN GREGORY, of Westminster, England, lately residing at Lisbon, Portugal, engineer, have invented or discovered certain new and useful "Improvements in Parts of the Permanent Way of Railways;" and I do hereby declare that the following is a full, true, and exact description thereof, reference being had to the accompanying drawings, and to the figures and letters marked thereon; that is to say—

This invention relates to the arrangement of improved parts of the permanent way of railways, and to the construction of certain of these parts, principally the sleepers and chairs, in cast-iron, malleable cast-iron, wrought-iron, steel, or in fire-clay or other earthy material.

Also, to the combination of such parts with wood, as the holding or supporting-parts of the permanent way, which is effected in such a manner as to insure elasticity, stability, and economy in such permanent way.

By reference to the drawings and the following description, it will be seen in what the improvements consist.

I. Each sleeper is cast in a flat form, with a strengthening-rib or ribs, *a*, on its under side.

This plan is represented in Figure 1,

Figure 2 being a side view of the same.

Upon the upper side of the sleeper are cast two vertical ribs, *b*, which ribs are parallel with each other, and are placed at any determined distance apart.

On the upper parts of these ribs are cast two jaws, *c*, and, by preference, the outside of the rail is held therein.

Recesses are cast in the inner sides of these ribs, so that wrought-iron double-hooked dogs, *d*, can be put within them, and passed through holes in the ribs or in the bottom of the sleeper, so as to hold down the rails at their inner lower flange.

These dogs are bent at right angles, and kept in position by means of a wood wedge, *e*, cut to such an angle as to suit the cant of the rails. This wedge, being driven in between the ribs and below the bottom of the rail, will fasten all the parts together, and the rail will bear upon the wood wedge only, which will thus act as an elastic cushion to the rail, preventing injurious vibration.

The wedges are kept from backing by angular ridges, *f*, cast on the upper side of the sleeper at right angles to the ribs, and these ridges are serrated, so that the bottom part of the wood wedge becomes compressed within the ridges, and is thus held firmly and prevented from breaking by shocks or concussions.

It is proposed, in most instances, to insert a tie-bar, *g*, to every sleeper, and the dogs may be welded or otherwise secured to the ends of the tie-bar. (See Figure 3.)

Projections may be forged on the end of the tie-bars, as in Figure 4, and the projections inserted within recesses cast in the ribs.

The wood wedges will securely keep these tie-bars in their places, and the sleepers will thus be absolutely tied together. These tie-bars may be of any convenient form or section.

The tie-bar may be placed in the centre of the bottom part of the sleeper, in a hollow rib there provided for it, and may be secured thereto by gibs and cotters, as shown by dotted lines in fig. 2.

Double jaws, with wood keys, may be used to fasten the rail to the sleeper, in place of the iron dogs, and the sleeper may, if preferred, be slightly curved.

II. It is proposed also, in some cases, to cast a central or third rib in the sleeper, as represented in Figure 5, of which Figure 6 is a side view.

In this rib a recess, *i*, is formed on either side of the rail, to receive a wrought-iron dog or dogs, *d*, and the cast-iron jaws may be placed on either side of the rail.

This central rib also may be used as a means of securing the tie-bars, which it is preferred to make of a hollow, flanged, or angle-iron section, dropping them over the central rib, and fastening them thereto, by either screw-bolts or gibs and cotters.

Two wood wedges, *e*, are used in this sleeper, giving increased bearing to the rails, and also keeping down the flanges of the tie-bar on the top of the sleeper.

Serrated ridges, *f*, are formed, as hereinbefore described, (I,) to prevent the backing of the wedges.

Ribs may be cast on the under side of the sleeper, for increased strength.

Although the circular or rectangular form of sleeper is preferred, other forms may be adopted and corrugated, and any section of rail can be used. The circular form is denoted by the dotted lines in fig. 5.

The dogs for this form of sleeper are of similar construction to those hereinbefore described, (I,) and adapted to the form of rail used.

In some instances it is proposed to use single or double cast-iron jaws on the side or centre ribs, and to secure the rail with wood keys in the usual way, instead of using dogs.

Iron or steel hollow wedges may be used instead of wood wedges, in countries where wood may be inapplicable on account of the ravages of the white ant or other insect. This form of wedge is shown in Figures 7 and 8.

III. When the improved sleepers are made of wrought-iron or steel, it is proposed to roll them of a trough-like form.

The upper ribs may be parallel, and the side recesses for the dogs and tie-bars may be forced out in a mould.

The wood wedge will secure all in position, as in the plans hereinbefore described. Similarly-shaped sleepers may be made of cast-iron.

It is proposed to use wrought-iron dogs only to secure the rail, and to place these dogs at opposite sides of the rail, cornerwise. The lower parts of the dogs are inserted in holes passing through the ribs or the bottom of the sleeper, and they receive great support at the back from being placed in recesses in the ribs; or the dogged tie-bars may be used to secure the outer part of the rail. This part of the improvements is illustrated by Figures 9, 10, and 11, the latter figure representing the wrought-iron dogs.

IV. A sleeper may be made with four ribs, *b*, (see Figures 12, 13, and 14,) the two centre ones being for the purpose of receiving the hooked dogs or half chairs on the inside of the rails.

The outer ribs have either cast jaws, *c*, for wood keys, or recesses for dogs. Between these ribs, wood wedges, *e*, may be driven.

In the centre space, supported by flanges, *h*, may be placed a corrugated sheet, *k*, of iron or steel, to support the centre of the rail, and for the purpose of giving, in use, elasticity to the same, the corrugated sheet bearing on the ballast, so as to impart an additional elasticity to the road.

The tie-bar, to unite the sleepers, may be similar to those hereinbefore described, but a straight bar is preferred, passing through a hollow rib below the centre of the sleeper, and secured by means of cotters at the ends of the tie-bar.

V. When the improved sleepers are made of fire-clay or earthy or similar artificial material, (see Figures 15 and 16,) there are used, for securing the rails, either dogs or wrought or cast-iron jaws, as may be preferred, or jaws of the material from which the sleeper is made, or wood keys may be used, as on the ordinary plan, and the rails may be fastened with wood keys.

The tie-bars are made, and will be secured to the sleeper, as before described.

In any or either of these sleepers hereinbefore described, the rail may be in line with, or at right angles to the length or breadth of the sleeper. (See fig. 16.)

In all cases the wood wedges are preferred to be used, which form the principal feature in these sleepers, insuring perfect elasticity in the road, and preventing the injurious effects of vibration or jar.

The sleepers hereinbefore described may be reduced in size, so as to form chairs to be used upon wood sleepers. The chair may be spiked to the sleeper by wood or iron spikes, placed below the wood wedge. The wood wedge will thus completely cover or enclose the spikes, and prevent their working out, and they will also be protected from injury by moisture.

The holes in the sleeper for the reception of the wedges may be placed angularly or cornerwise to each other. When used as a chair, no under ribs will be required. This plan is illustrated in Figures 18, 19, and 20.

It is proposed, in some cases, to make the sleepers and chairs of malleable cast-iron.

It will be seen that in all the applications before described of the invention, the rail may be turned with great advantage, as it will have no indentations, such as are caused when the rail bears upon iron.

What I claim, and desire to secure by Letters Patent, is—

1. The method of fastening or securing the rails to the sleepers or chairs, by driving wooden wedges of any suitable form beneath the rails, in such manner that they form an elastic support for the rail, and bind and hold together the rails, sleepers, and other parts, or rails, chairs, and other parts, forming the permanent way, as and for the purpose described.

2. The railway-sleeper, or sleeper and chair combined, constructed substantially as herein shown and described.

3. In combination with the sleeper or sleepers and chairs, as constructed, the double-hooked dogs *d*, operating substantially as set forth.

In witness whereof, I, the said JOHN GREGORY, have hereunto set my hand, this 25th day of May, 1860.

Witnesses: JOHN GREGORY.

J. C. NEWBURN,
172 *Fleet Street, London, Patent Agent.*

G. BACON,
172 *Fleet Street, London.*

1669 & 1670

EXHIBIT S2.

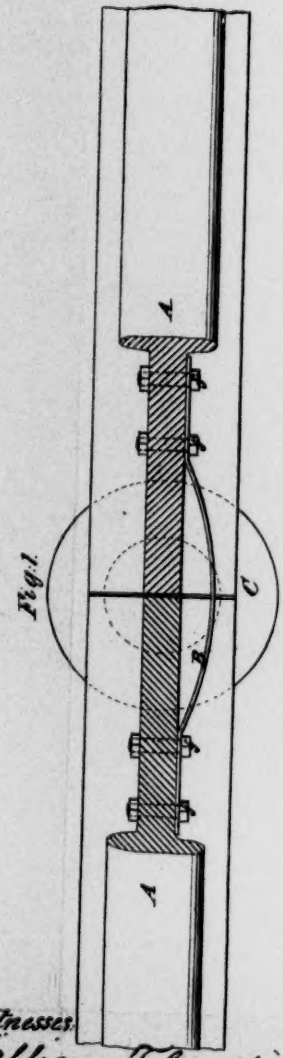
KATE S. HOLMES,
Notary Public.

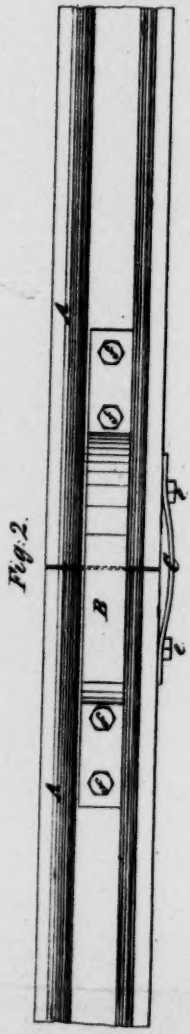
1076

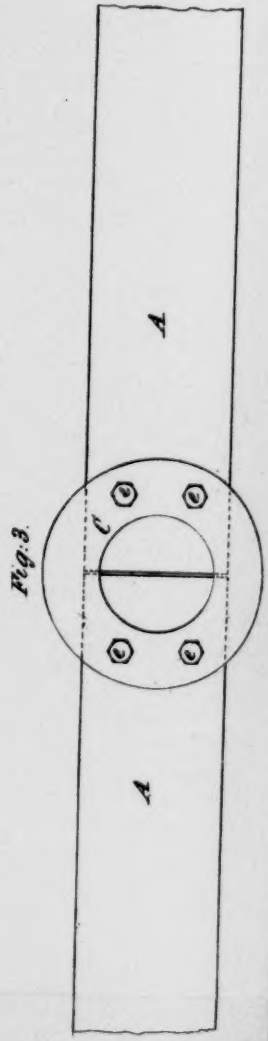
CLINTON ROOSEVELT.

Improvement in Splice Pieces for Railway Rails.

No. 124,856. Patented March 19, 1872.







Witnesses.
William F. Goodhill.
Wm. H. Woodman

Inventor.
Clinton Roosevelt

124,856

UNITED STATES PATENT OFFICE.

CLINTON ROOSEVELT, OF NEW YORK, N. Y.

IMPROVEMENT IN SPLICE-PIECES FOR RAILWAY RAILS.

Specification forming part of Letters Patent No. 124,856, dated March 19, 1872.

Specification describing certain Improvements in Connecting Rails for Tramways, invented by CLINTON ROOSEVELT, of the city of New York, in the State of New York.

My invention has for its object connecting the ends of the rails for tramways by springs attached to the ends of the rails, and so formed as to keep a perfect connection under all the changes that may occur in the expansion or contraction of the rails by the changes in temperature to which they may be exposed.

To enable others skilled in the art of connecting rails for railway purposes, reference is made to the drawing forming a part of this specification—

Figure 1 thereof showing the joint, with the upper portion of the rail cut away so as to exhibit the position and mode of connecting the curved spring-strap B. Fig. 2 is a side elevation of the ends of two rails joined. Fig. 3 exhibits the circular spring C, bolted or riveted on the under ends of the rails, and thereby joined, so as to allow for the expansions and contractions of the rails by heat or cold. Fig. 4 exhibits a cross-cut section, with the spring C reversed from the showing of Fig. 2.

The principle of this invention is to make the spring-strap B so as to elongate in cold weather, and to make a shorter curve in warm weather; and the circular spring C so as to be oblong in the line of the rails in winter and transversely oblong in hot weather by expansion of the rails, and yet holding the ends of the rails at all times firmly in position, and answering, at the same time, the purposes of a railroad chair.

It is contemplated to use the spring C alone or in connection with the curved strap B.

What I claim is—

The spring C, for connecting the ends of the rails and also serving as a chair, substantially as herein set forth.

CLINTON ROOSEVELT.

Witnesses:

WILLIAM F. GOODHILL,
WM. H. WOODMAN.

1675 & 1676

EXHIBIT S67.

KATE S. HOLMES,
Notary Public.

J. L. HUDSON.

Railway-Rail Joints.

No. 142,020. Patented August 19, 1873.

Fig 1

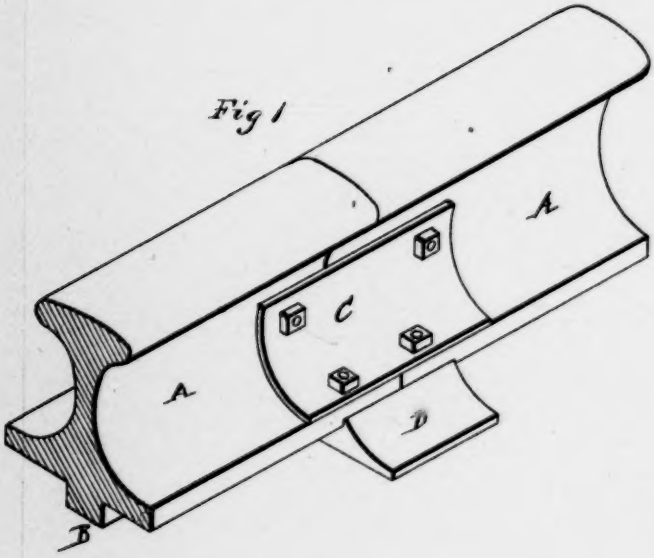
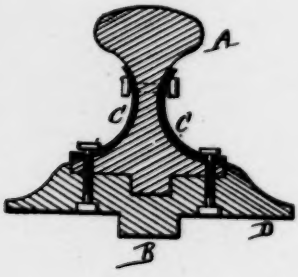


Fig 2



Witnesses:
H. L. Durand
C. L. Emmons

Inventor.
John L. Hudson
per Alexander Hudson
Attorneys.

UNITED STATES PATENT OFFICE.

JOHN L. HUDSON, OF CUMMING, GEORGIA.

IMPROVEMENT IN RAILWAY-RAIL JOINTS.

Specification forming part of Letters Patent No. **142,020**, dated August 19, 1873; application filed June 25, 1873.

To all whom it may concern:

Be it known that I, JOHN L. HUDSON, of Cumming, in the county of Forsyth and in the State of Georgia, have invented certain new and useful Improvements in Railroad Rail and Joint; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon, making a part of this specification.

The nature of my invention consists in the combination of rails having flanges formed on their under sides, a chair with corresponding grooves, and curved plates covering the joints on the sides of the rails, all as hereinafter more fully set forth.

In the annexed drawings, A A represent the two contiguous rails of a track. The bottom side of each is provided with a flange, B, which extends downward, and which may be made in the shape seen, or it may be V or other suitable shape. The chair D has a depression or groove formed in it to correspond with the rib or flange on the rail. The rib or flange fits snugly into this depression or groove, and thus the rail is held more securely and with less chance of spreading or separating. Upon each side of the rails, at their joints, are bolted the curved metallic plates C C. These plates fit snugly against the rails, and serve to break the joint between them and bind them firmly together.

Having thus fully described my invention, what I claim is—

The combination of the rails A A, with flanges B B on their under sides, the grooved chair D, and curved plates C C, all constructed and arranged substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 5th day of June, 1873.

J. L. HUDSON.

Witnesses:
W. H. SMITH,
JOSEPH L. JOHNSTON.

1681 & 1682 U. S. Cir. Ct., Northern Dist. Ill., Eastern Div.

RAILROAD SUPPLY CO.

vs.

HART STEEL CO. & G. S. WOOD.

U. S. Cir. Ct., Northern Dist. Ohio, Eastern Div.

RAILROAD SUPPLY CO.

vs.

ELYRIA STEEL & IRON CO.

DEFENDANTS' EXHIBIT HHH.

KATE S. HOLMES,
Notary Public.

1082

C. B. SHELDON.

Joint-Support for Street-Railway Rails.

No. 164,776. Patented June 22, 1875.

Fig. 1

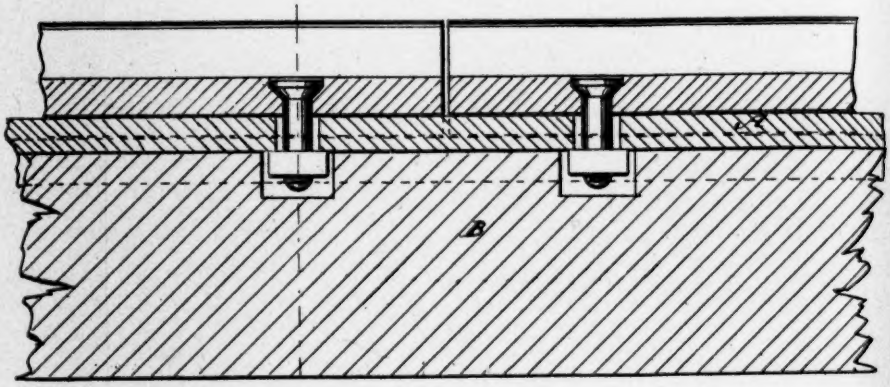
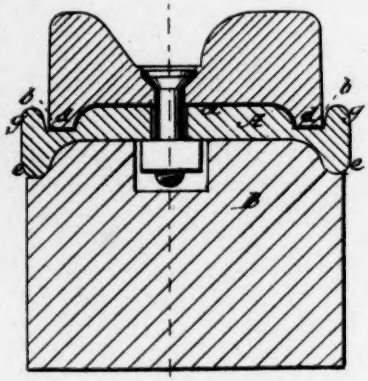


Fig. 2.



WITNESSES:

E. Wolff.

Alex F. Roberts

INVENTOR:

C. B. Sheldon

BY

ATTORNEYS

UNITED STATES PATENT OFFICE.

CEVEDRA B. SHELDON, OF NEW YORK, N. Y.

IMPROVEMENT IN JOINT-SUPPORTS FOR STREET-RAILWAY RAILS.

Specification forming part of Letters Patent No. **164,776**, dated June 22, 1875; application filed May 3, 1875.

To all whom it may concern:

Be it known that I, CEVEDRA B. SHELDON, of the city, county, and State of New York, have invented a new and Improved Rail-Splice, of which the following is a specification:

My invention consists of a splice-plate for rails laid on stringers, as they are commonly arranged for street-railways, which is flanged on the under side to conform to the upper side of the stringer, the corners of which are commonly beveled off to prevent the plate from shifting laterally, and on its upper side it is crowning in the middle portion and grooved and flanged at the edges to conform to the grooved under side of the rail, and also to confine it between the flanges to prevent the rail from lateral movement; and the plate has elongated bolt-holes, through which it is firmly bolted to the rails by bolts whose heads are countersunk in the bottom of the groove in the upper side of the rail, so as to hold the rail ends and the plates firmly together to prevent the spring of the rails up and down—now so common on all street-roads, in consequence of the faulty arrangement of the ends. By my plan the two rails are firmly bolted to the plate so that one cannot rise without the other, and it is of no particular consequence whether the plate is fastened to the stringer or not; but I prefer to fasten it by spikes, and I will use nut-fastenings of any approved kind to prevent the nuts of the bolts from working loose. In the common arrangement the rail ends are laid on a short flat plate, and they are spiked back of the plate to the stringer, but the spikes soon draw so that the ends are free to spring independently of each other, and they soon become so loose, and the plate settles into the stringer so, that the jolting common to all roads ensues very soon, no matter how well laid.

Figure 1 is a longitudinal sectional elevation of my improved rail-splice. Fig. 2 is a cross-section.

Similar letters of reference indicate corresponding parts.

A is the splice-plate, which is arched transversely, or, in other words, has a crowning upper side, *a*, corresponding in form to the under side of the rail, with grooves *b* along the margins to receive, inside of ribs *g*, the ribs or flanges *d*, with which the rail is commonly provided on the under side to keep it on the stringer B, and on the margins of the lower side of the plate A is a rib or flange, *e*, to fit the beveled corners of the stringer. *f* represents the bolts for securing the rail ends and the plate together. They are countersunk at the head in the bottom of the groove in the upper side of the rail so as not to interfere with the flanges of the wheels. The holes for these bolts will be elongated in the rail or the plate to allow for expansion and contraction, and the nuts will be secured by fastenings of any approved kind.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A splice-plate for rails laid on stringers, firmly bolted to both rail ends, and having flanges to prevent lateral play on the stringer, also flanges to prevent lateral play of the rails, substantially as specified.

2. The spice-plate for rails laid on stringers having a crowning middle portion of the web corresponding with and fitting in the under side of the rail, in combination with ribs *g* for preventing lateral movement of the rails, substantially as specified.

CEVEDRA B. SHELDON.

Witnesses:

T. B. MOSHER,

C. SEDGWICK.

687 & 1688 U. S. Cir. Ct., Northern Dist. Ills., Eastern Div.

RAILROAD SUPPLY CO.

vs.

HART STEEL CO. & G. S. WOOD.

U. S. Cir. Ct., Northern Dist. Ohio, Eastern Div.

RAILROAD SUPPLY CO.

vs.

ELYRIA STEEL & IRON CO.

DEFENDANTS' EXHIBIT III.

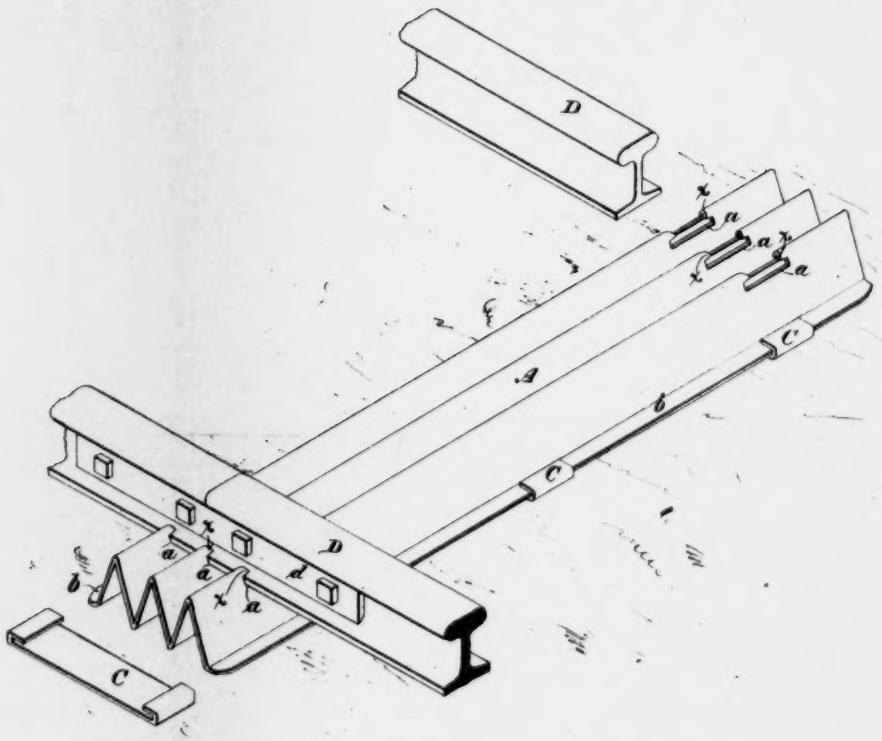
KATE S. HOLMES,
Notary Public.

1085

D. S. WHITTENHALL.

RAILROAD TIES.

No. 185,808. Patented Dec. 26, 1876.



WITNESSES

Wm A. Hinkle

L Stith

INVENTOR

Daniel S. Whittenhall.

By his Attorneys.

Baldwin, Hopkins, and Peyton

UNITED STATES PATENT OFFICE.

1086

DANIEL S. WHITTENHALL, OF CHICAGO, ILLINOIS, ASSIGNOR TO HIMSELF AND A. HALSEY MILLER, OF SAME PLACE.

IMPROVEMENT IN RAILROAD-TIES.

Specification forming part of Letters Patent No. **185,808**, dated December 26, 1876; application filed October 17, 1876.

To all whom it may concern:

Be it known that I, DANIEL S. WHITTENHALL, of the city of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Railroad Cross-Ties, of which the following is a specification, that will enable those skilled in the art to which my invention appertains to make and use the same, reference being had to the accompanying drawings.

The object of my invention is to provide, as a substitute for the cross-ties of wood and other material now in use upon railroads, a metal cross-tie and chair for securing the rails in place upon the road-bed.

My invention consists in a cross-tie made of a single piece of metal, corrugated in the process of manufacture, and provided with a series of fitting transverse apertures near its opposite ends for receiving and seating the track-rails.

The drawings exhibit a view of my invention in perspective.

A indicates my metal cross-tie, ribbed or corrugated longitudinally from end to end. *a a* indicate the rail seats or chairs, which consist of suitably-shaped transverse slots or openings in and through the ribs of the tie. Those illustrated are adapted to receive the bases of common T-rails; but other forms of rail-seats may be used, adapted to other forms of rails. *b b* indicate flanges on the opposite sides of the tie, which serve to widen its base and increase its stability; but these may, in some cases, be dispensed with. C C indicate adjustable clamps or stays, that may be employed, when desirable, to prevent spreading of the base of the tie. When these stays are used less metal may be employed for the ties. D D indicate the ordinary T-rails, and *d* an ordinary fish-plate at the junction of two rails.

I prefer to form my ties of wrought sheet-iron, by heating and punching or cutting the chair seats, and then rolling or crimping the plates into the ribbed or corrugated form illustrated; but the chair-slots may be formed after the crimping or rolling has been accomplished. However, my invention is not dependent upon any particular method of manufacture.

The utility of my invention rests in its economy, durability, efficiency, and the special attributes it possesses, owing to the form and material combined in its production.

By the use of my ties in the work of laying track, no gaging is necessary, because each tie is to be applied upon the bases of the rails, and thus becomes itself a true gage for the track. Their use also dispenses with chairs (although chairs might be employed) and spikes, because, in lieu of the latter, a blow upon the tips (marked *x x* in the drawings) will drive them down in contact with the rails, and firmly hold the rails in place. They also serve as an effective drain for the surface of the road-bed, as water will be conducted off at each end of every tie through the troughs formed between the ribs or corrugations. Furthermore, they are not destructible by fire or liable to be floated out of place by water, and, therefore, save much labor and expense in keeping the track in order. They can be galvanized to protect them from rust; but if disabled from that cause, they can be rerolled, and the cost of metal for new ties thus saved. Finally, they effect a great saving of life and property by preventing those frequent accidents which result from the spreading of the tracks. When my ties are used the tracks cannot spread.

Having thus set forth the nature and utility of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A longitudinally ribbed or corrugated sheet-metal cross-tie, provided with slots or rail-seats.

2. A longitudinally ribbed or corrugated sheet-metal cross-tie, provided with slots or rail-seats, and with lateral flanges at its base.

3. The combination of a longitudinally ribbed or corrugated sheet-metal cross-tie with base stays or clamps.

In testimony whereof I have hereunto subscribed my name.

DANIEL S. WHITTENHALL.

Witnesses:
E. C. DAVIDSON,
H. T. EARNEST.

I. WELLS.
Railway-Chair.

No. 203,570. Patented May 14, 1878.

Fig. 1.

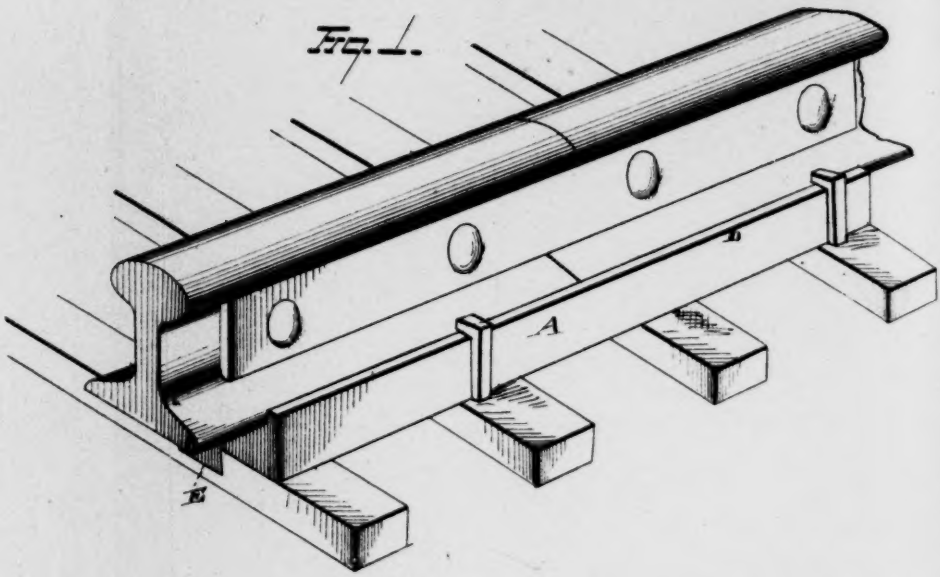


Fig. 2.

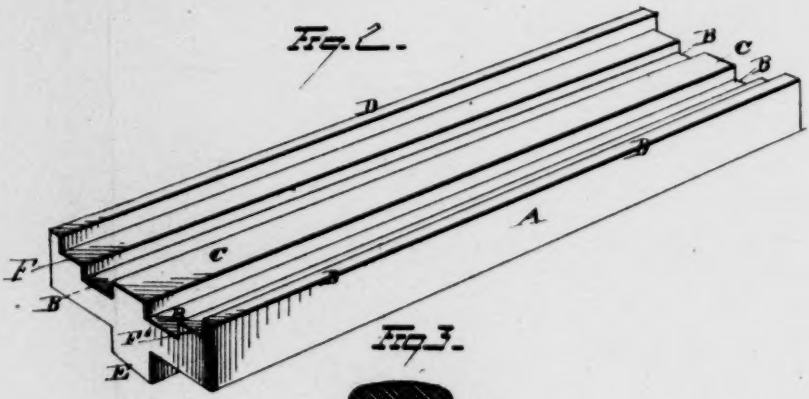
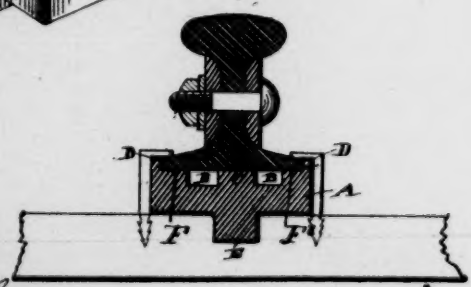


Fig. 3.



WITNESSES
Edd. L. Nottingham
A. W. Bright.

INVENTOR
Isaac Wells.
By H. A. Seymour.
ATTORNEY

UNITED STATES PATENT OFFICE.

ISAAC WELLS, OF EAST HAMPTON, CONNECTICUT, ASSIGNOR OF ONE-HALF HIS RIGHT TO JAMES F. POST, OF WILMINGTON, NORTH CAROLINA, AND DAVID D. BARBER, OF SUMTER COUNTY, SOUTH CAROLINA.

IMPROVEMENT IN RAILWAY-CHAIRS.

Specification forming part of Letters Patent No. **203,370**, dated May 14, 1878; application filed February 1, 1878.

To all whom it may concern:

Be it known that I, ISAAC WELLS, of East Hampton, in the county of Middlesex and State of Connecticut, have invented certain new and useful Improvements in Railway-Chairs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements in railway-chairs; and it consists in a wrought-metal chair adapted to support the joints of railroad-rails, and bridge or span two or more sleepers at such points, the said chair having three independent bearings on its upper surface and a central depending flange on its lower surface, the bearings on the upper surface serving for the edges and center of the base of the rail, while the depending flange on the lower surface of the chair serves to impart increased strength and stiffness to the central portion of the chair, and to prevent the lateral displacement of the same when in use.

In the accompanying drawings, Figure 1 is a view, in perspective, of my improved chair supporting ordinary rails at their joint. Fig. 2 is a view, in perspective, of the chair detached from the rails; and Fig. 3 is a transverse section taken through the chair and rails.

A represents a wrought-metal railway-chair, which is adapted to support railway-rails at their joints, and to be rolled into the desired form. The upper surface of the chair is provided with three independent bearings, F, C, and F′, all located in the same horizontal plane. The central bearing, C, is located directly beneath the web of the rail, and serves to sustain the greater portion of the weight of the passing trains. The side bearings F F′ serve to support the edges of the rail-flange, and thus afford a broad and extended bearing for the rail, and prevent the same from rocking. Bearings F F′ extend under the flanges of the rail only so far as is necessary to resist lateral or leverage strains on the rail, the weight of the train being taken chiefly by bearing C and depending rib E, hereinafter described. Said bearings F F′ are thus separated from the central bearing C by grooves B B, which also serve as receptacles for sand or grit that may enter between the chair and rail, and thus insure a firm bearing of the rail on the chair-bearings at all times.

The grooves B B also enable the chair to be made much lighter than the ordinary chair, and yet possess an equal amount of strength, owing to the fact that the rail is fully supported at all points where the chair is subjected to strain—namely, at its center and sides.

The outer edges of the chair are provided with raised flanges D D, which extend up flush with the upper surface of the flange of the rail, and thus prevent any lateral displacement of the latter; and as the sides of the chair are vertical, they allow the heads of the rail-spikes (made sufficiently broad for the purpose) to be driven firmly against the upper surfaces of the rail-flange and upper edges of the chair-flanges D D. The lower central rib E is located directly beneath the central bearing C, and serves to prevent the lateral displacement, and to add to the longitudinal rigidity of the chair.

I am aware that it is not new with me to provide a railway-chair with a lower depending rib to prevent the lateral displacement of the chair, and add to its longitudinal rigidity; but to secure the latter result, if the vertical depth of said rib is all below the bed of the chair, the sleeper has to be cut into too deep in order to place the chair. I extend its vertical measure partly above said bed, and add flange-bearings F F′, as above described.

I am also aware that railway-chairs have been provided with side flanges to prevent the lateral displacement of the rail, and with a lower depending flange to prevent any lateral movement of the chair, the same being shown and described in the patent to J. L. Hudson, dated August 10, 1873, and hence I make no claim to such construction.

My improved chair differs from the above-referred-to in the following particulars: It has three independent bearings for the edges

and center of the flange of the rail, and, also, it is so constructed that the spikes which hold it in place also hold the rail in the chair.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

A railway-chair constructed with vertical sides, which extend above and constitute side flanges, and provided on its upper surface with central bearing C, side bearings F F′, and grooves B B, and having a lower depending flange, E, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 31st day of January, 1878.

ISAAC WELLS.

Witnesses:
A. W. BRIGHT,
THOS. B. HALL.

)& 1700

EXHIBIT S4.

KATE S. HOLMES,
Notary Public.

(No Model.)

D. SERVIS.

WEAR PLATE FOR RAILROAD TIES.

No. 249,407. Patented Nov. 8, 1881.

Fig: 1.

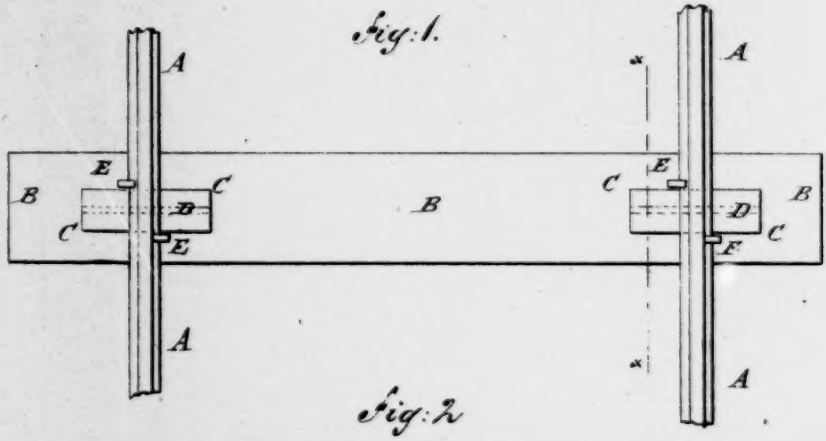


Fig: 2.

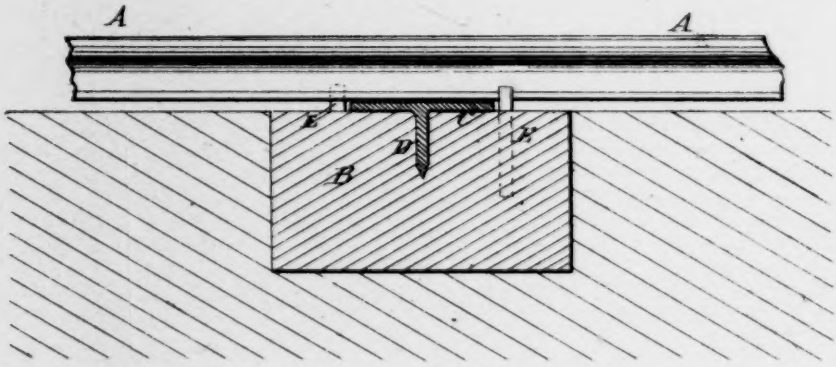


Fig: 3.

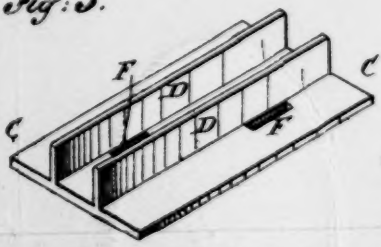
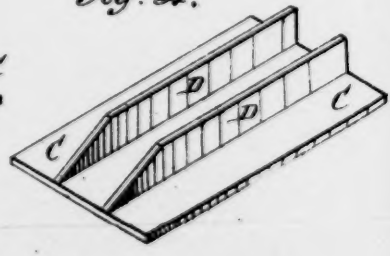


Fig: 4.



WITNESSES:

Chas. Nicol.

C. Sedgwick

INVENTOR:

D. Servis

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

DAVID SERVIS, OF NEW YORK, N. Y.

WEAR-PLATE FOR RAILROAD-TIES.

SPECIFICATION forming part of Letters Patent No. 249,407, dated November 8, 1881.

Application filed April 6, 1881. (No model.)

o all whom it may concern:

Be it known that I, DAVID SERVIS, of the ity, county, and State of New York, have in- ented a new and useful Improvement in Wear- lates for Railroad-Ties, of which the fol'ow- ig is a specification.

Figure 1 is a plan view of my improvement, lustrating its use. Fig. 2 is a sectional ele, ation of the same, taken through the line *x x*, ig. 1. Figs. 3 and 4 are perspective views of odifications of the improvement shown in- erted.

Similar letters of reference indicate corre- ponding parts.

The object of this invention is to increase ie durability of railroad-ties.

In the accompanying drawings, A represents railroad-rail, and B is a tie, sleeper, or other mber upon which the rail A rests.

C is an iron plate of any convenient width, id of such a length as to pass beneath the se of a rail, B, and project at both ends be- ond the said rail, as shown in Fig. 1. Upon ie lower side of the plate C are formed one more flanges, D, which are made thin, so at they can be driven into the tie or sleeper lengthwise of the grain of the wood without litting or otherwise materially affecting the mber. The plates C are designed to be made such a width that they will pass between e spikes E, that secure the bases of the rails the ties or sleepers; or the plates C can be ade wider, as shown in Fig. 3, in which case ots or notches F can be formed in the said ate C, as shown in Fig. 3, to receive the spikes . When the plates C are to be applied to the es or sleepers B before they are laid or be- fore the rails A are spiked to them the flanges D can be made rectangular or with square ends, as shown in Fig. 3. When the wear-plates C are to be applied to ties or sleepers B to which the rails have already been spiked the flanges D are rounded or beveled at one end, as shown in Fig. 4, so that the end of the plate C can be entered between the base of the rail and the tie or sleeper, and the plate then driven into place, the flanges D readily forcing their way into the timber. With this construction the plates C prevent the base of the rail from wearing and cutting the grain of the wood and thus destroying the ties or sleepers, so that soft wood can be used for ties and sleepers, and will last until destroyed by decay. With this construction, also, the flange or flanges D strengthen the plates C, so that the said plates can be made light, and so that a pressure upon the rails will not bend or curve the plates, the said pressure putting the said flanges under a tensile strain, which firmly resists the tendency of the plates to bend.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

In a wear-plate for railroad-ties, the flange or flanges D, formed upon the lower side of the plate C, and beveled or rounded at one end, substantially as herein shown and described, to adapt the wear-plate to be driven in between a rail and a tie or sleeper without displacing the said rail, as set forth.

DAVID SERVIS.

Witnesses:

JAMES T. GRAHAM,

C. SEDGWICK.

D. SERVIS,

Assignor, by mesne assignments, to THE SERVIS RAILROAD TIE PLATE COMPANY.

WEAR PLATE FOR RAILROAD TIES.

No. 10,302. Reissued Apr. 3, 1883.

Fig. 1.

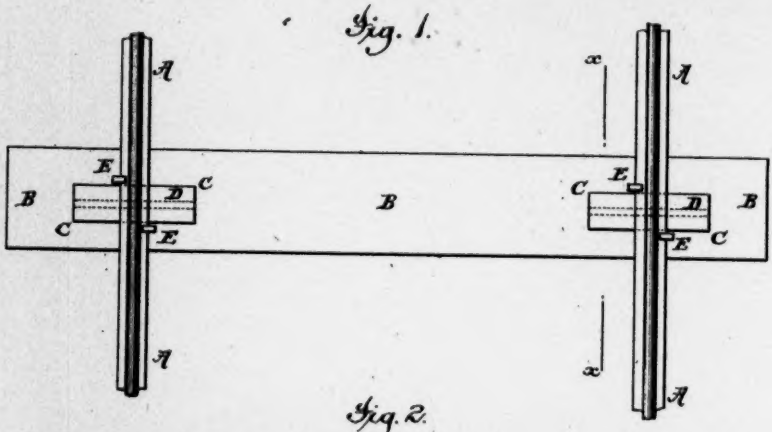


Fig. 2.

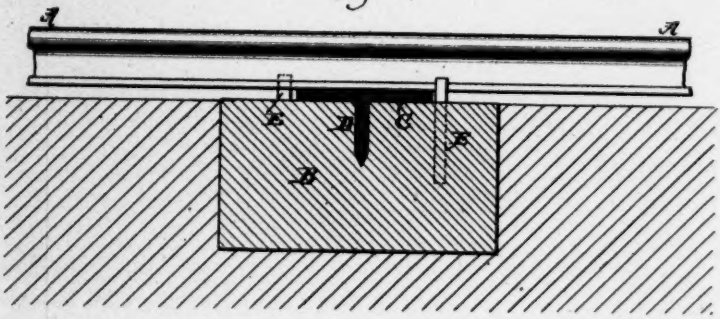


Fig. 3.

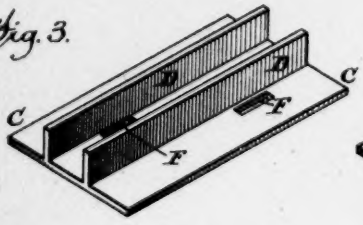
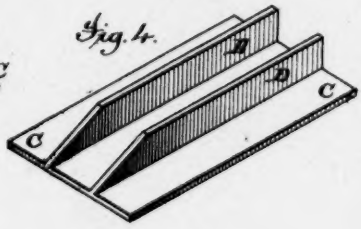


Fig. 4.



Attest:

Geo. H. Graham

F. H. Palmer

Inventor,

David Servis,

by Munson & Philipp

Attys.

UNITED STATES PATENT OFFICE.

DAVID SERVIS, OF SENNETT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE SERVIS RAILROAD TIE PLATE COMPANY, OF NEW YORK, N. Y.

WEAR-PLATE FOR RAILROAD-TIES.

SPECIFICATION forming part of Reissued Letters Patent No. 10,302, dated April 3, 1883.

Original No. 249,407, dated November 8, 1881. Application for reissue filed December 27, 1882.

To all whom it may concern:

Be it known that I, DAVID SERVIS, formerly of the city, county, and State of New York, but now residing at Sennett, in the county of Cayuga, in said State, have invented a new and useful Improvement in Wear-Plates for Railroad-Ties, of which the following is a specification.

Figure 1 is a plan view of my improvement, illustrating its use. Fig. 2 is a sectional elevation of the same, taken through the line *x x*, Fig. 1. Figs. 3 and 4 are perspective views of modifications of the improvement shown inverted.

Similar letters of reference indicate corresponding parts.

The object of this invention is to increase the durability of railroad-ties.

In the accompanying drawings, A represents a railroad-rail, and B is a tie, sleeper, or other timber upon which the rail A rests.

C is an iron plate of any convenient width, and of such a length as to pass beneath the base of a rail, A, and project at both ends beyond the said rail, as shown in Fig. 1. Upon the lower side of the plate C are formed one or more flanges, D, which are made thin, so that they can be driven into the tie or sleeper B lengthwise of the grain of the wood without splitting or otherwise materially affecting the timber. The plates C are designed to be made of such a width that they will pass between the spikes E, that secure the bases of the rails to the ties or sleepers; or the plates C can be made wider, as shown in Fig. 3, in which case slots or notches F can be formed in the said plate C, as shown in Fig. 3, to receive the spikes E. When the plates C are to be applied to the ties or sleepers B before they are laid, or before the rails A are spiked to them, the flanges D can be made rectangular or with square ends, as shown in Fig. 3. When the wear-plates C are to be applied to ties or sleepers B to which the rails have already been spiked the flanges D are rounded or beveled at one end, as shown in Fig. 4, so that the end of the plate C can be entered between the base of the rail and the tie or sleeper, and the plate then driven into place, the flanges D readily forcing their way into the timber. With this construction the plates C prevent the base of the rail from wearing and cutting the grain of the wood, and thus destroying the ties or sleepers, so that soft wood can be used for ties and sleepers, and will last until destroyed by decay. With this construction, also, the flange or flanges D strengthen the plates C, so that the said plates can be made light, and so that a pressure upon the rails will not bend or curve the plates, the said pressure putting the said flanges under a tensile strain, which firmly resists the tendency of the plates to bend.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A wear-plate for railroad-ties, consisting of a short plate of metal, provided with a projecting flange or flanges, D, said plate being adapted to operate as a rail-seat, and its flange or flanges to support the same by being entered into the tie longitudinally or lengthwise of the grain of the tie, all substantially as described.

2. The combination, with a railroad-rail and supporting cross-tie, of a metal wear-plate consisting of a body having one or more projecting flanges, said plate being interposed between the rail and tie, with its flange or flanges entered into the tie longitudinally or lengthwise of the grain of the wood composing the tie, substantially as described.

3. In a wear-plate for railroad-ties, the flange or flanges D, formed upon the lower side of the plate C, and beveled or rounded at one end, substantially as herein shown and described, to adapt the wear-plate to be driven in between a rail and a tie or sleeper without displacing the said rail, as set forth.

In testimony whereof I have hereunto subscribed my name in presence of two subscribing witnesses.

DAVID SERVIS

Witnesses:
H. T. MUNSON,
T. H. PALMER.

1098

(No Model.)

W. F. GOULD.

RAILROAD RAIL CUSHION AND JOINT.

Patented June 26, 1883.

No. 280,030

Fig. 1

Fig. 2

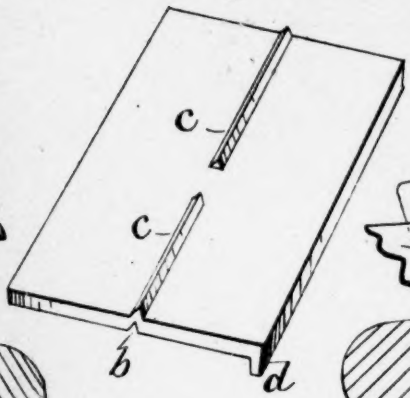


Fig. 3

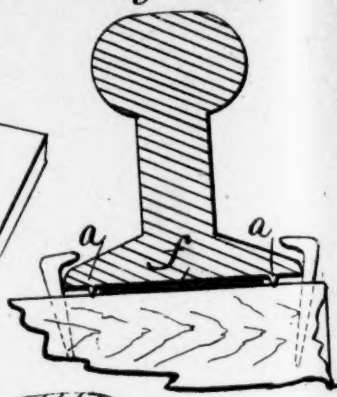


Fig. 4

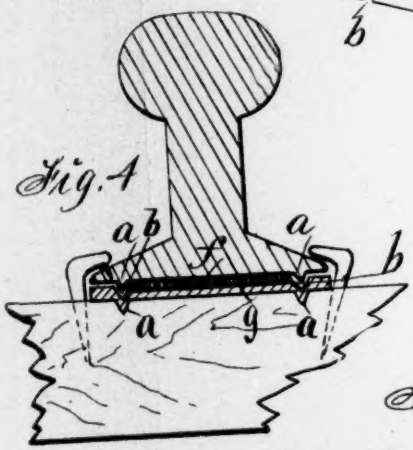


Fig. 5

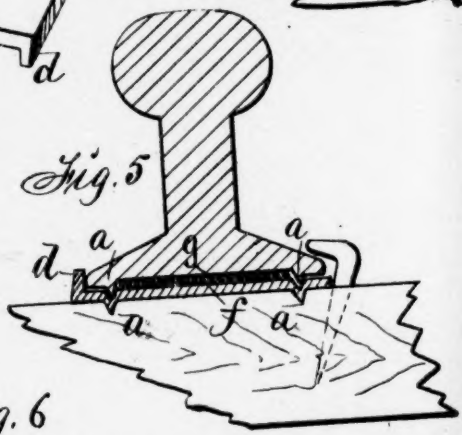
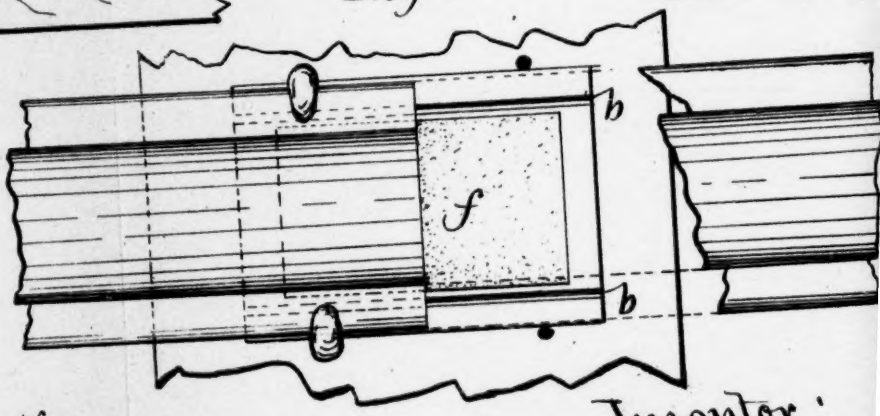


Fig. 6



Witnesses:

W. E. Dippert

A. C. Guthrie

Inventor:

William F. Gould

By Thomas G. Orwig, Atty.

UNITED STATES PATENT OFFICE.

WILLIAM F. GOULD, OF STUART, IOWA.

RAILROAD-RAIL CUSHION AND JOINT.

SPECIFICATION forming part of Letters Patent No. 280,030, dated June 26, 1883.

Application filed August 4, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. GOULD, of Stuart, in the county of Guthrie and State of Iowa, have invented an Improved Railroad-Rail Cushion and Joint, of which the following is a specification.

The object of my invention is to save time and labor in fixing metal rails to wooden cross-ties, so as to prevent any lateral movement of the rails and spreading of the track, and without interfering with the longitudinal expansion and contraction of the rails; to prevent the slipping and displacement of packing or or cushioning material from under the rails, and to improve the construction and durability of rail-joints and complete railway-tracks.

Heretofore flanges have been formed integral with the bottom edges of metal rails in such a manner as to be adapted to overlap the longitudinal top edges of wooden rails upon which they were fixed in the construction of tramways or street-car railways. Continuous ribs have also been formed integral with the under sides of locomotive railway-rails to enter corresponding grooves formed transversely in the upper faces of wooden cross-ties for the purpose of preventing lateral movement of the rails relative to the ties and complete track; but flanges on the edges of rails, when let into wooden cross-ties, will conduct water into the grooves and facilitate the soaking and decay of the ties at the points where they are subjected to the greatest pressure and wear by passing trains; and cutting away wood by chamfering or grooving ties across their top surfaces, to admit the insertion of ribs formed on the bottoms of metal rails, impairs the strength and durability of the ties, and requires much time and labor. To avoid these objections and attain the advantages desired, I form V ped beads on the bottoms of rails and tes, and combine rails, ties, cushions, and tes, as hereinafter fully set forth, in such anner that the metal beads can be readily bedded into the top faces of wooden cross- s by the weight of a locomotive or construc- n-train, and to thereby facilitate the lay- , cushioning, and jointing of rails, and the ilding of improved tracks and complete rail- ds.

igure 1 of my accompanying drawings is a cross-section view of a metal rail having a single longitudinal and continuous bead, *a*, formed integral with its under side. Fig. 2 is a perspective view of my improved railway chair or plate in an inverted position. It has a continuous groove, *b*, in its top surface to admit the bead *a* on the bottom of the rail, and two sections or distinct sharp-edged beads, *c c*, immediately under the groove *b*, and a vertical flange, *d*, at one of its sides and top edges. The inner ends of the beads *c* form shoulders to engage the wooden ties, and to thereby prevent the longitudinal movement of the plate relative to the tie and track. Fig. 3 is a sectional view showing a rail having two parallel and continuous sharp-edged beads, *a*, on its bottom, resting upon the top surface of a wooden cross-tie, and a rubber plate or cushion, *f*, inclosed between the beads *a*. Fig. 4 is a sectional view showing a rail having two parallel beads, *a*, a chair or joint plate having two corresponding beads, *a*, on its bottom, and two grooves, *b*, and a sunken panel, *g*, between said grooves in its top, a cushion, *f*, and a wooden cross-tie, combined and fastened together by means of common spikes. Fig. 5 is a sectional view showing a sunken panel, *g*, between the two parallel beads *a* on the bottom of the rail, for the reception of a rubber plate or cushion in such a manner that the sides of the bottom of the rail will be allowed to come in contact with the top surface of my improved metal plate, having beads *a*, grooves *c*, and a flange, *d*. Fig. 6 is a top view of my improved rail-joint, showing the end of one of the rails broken away to uncover sections of the cushioning and binding plates. Jointly considered, these figures clearly illustrate the construction, operation, and utility of my complete invention.

My improved rails and plates, having beads adapted to be pressed down and embedded in the top surfaces of wooden cross-ties without removing any wood, may be formed by means of suitable rollers and dies in the way rails are generally made, and may vary in shape, size, and weight as desired. The beads designed to be embedded into the wood by pressure may also vary in configuration, size, and number. It is not essential that they should be V-shaped and sharp-edged, but sufficiently

small and thin so as to be adapted to be sunken into the wood by the pressure of a locomotive as a construction-train is advanced upon the rails when placed in proper position upon the ties, as indicated by Figs. 3, 4, 5, and 6.

I am aware that rails having continuous strengthening-ribs on their under sides have been pressed into the tops of posts or piles, and therefore do not claim that forming ribs on the bottoms of rails and pressing the ribs into wood is new; but shaping ribs or fins that are continuous on the bottoms of rails in the manner set forth, to adapt them to be pressed into the top surfaces of a series of ties, and then uniting them with a series of ties, in the manner specified, by advancing a locomotive, car, or construction-train upon the rails to press the ribs of the rails into the ties, is novel and greatly advantageous.

I claim as my invention—

1. The hereinbefore-described method of combining railway-rails with a series of cross-ties, to prevent any lateral movements of the rails and ties relative to each other, and to economize time and labor in constructing a track, which method consists, essentially, in forming continuous small and sharp-edged ribs on the under sides of rails and then placing and fastening them upon a series of cross-ties and advancing a locomotive, car, or train upon the rails to press the ribs on the rails into the top surfaces of the ties, substantially as set forth.

2. The improved railway chair or plate, illustrated by Fig. 2, having one or more longitudinal grooves in its top surface, and two or more distinct beads and shoulders on its under surface, substantially as and for the purposes specified.

3. The combination of a metal rail having two or more parallel longitudinal beads on its bottom, a rubber plate or cushion, and a cross-tie, substantially as shown and described, for the purposes specified.

4. The combination of two metal rails, each having two or more beads on its bottom, a rubber plate or cushion, a metal plate having grooves in its top surface corresponding with the beads on the rail, and one or more beads on its under side, and a cross-tie, substantially as and for the purposes specified.

WILLIAM F. GOULD.

Witnesses:
THOMAS G. ORWIG,
S. J. COPE.

7 & 1718

EXHIBIT S7.

KATE S. HOLMES,
Notary Public.

1102

(No Model.)

D. SERVIS.

WEAR PLATE FOR RAILROAD TIES.

No. 294,816. Patented Mar. 11, 1884.

Fig: 1.

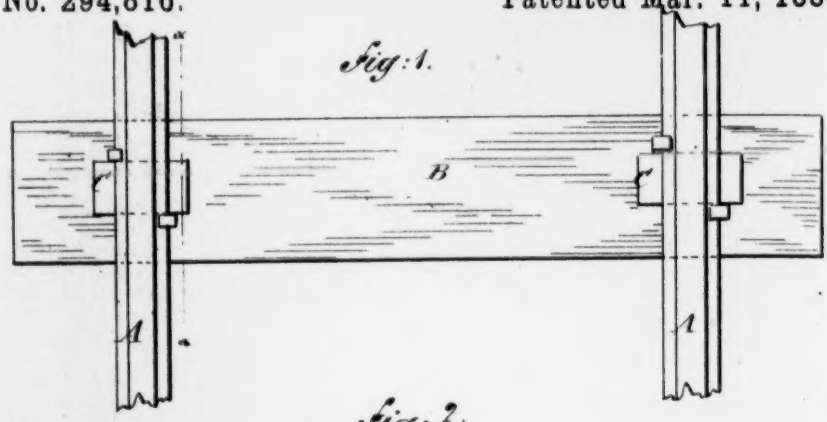


Fig: 2

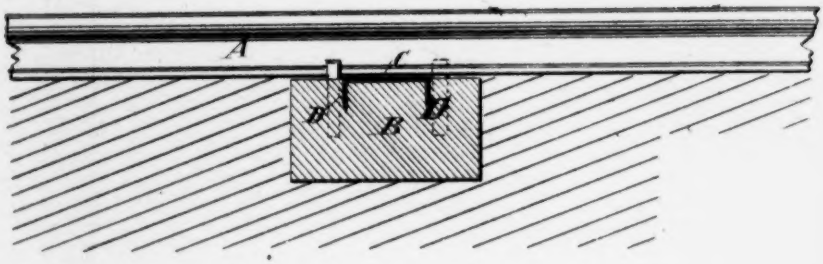
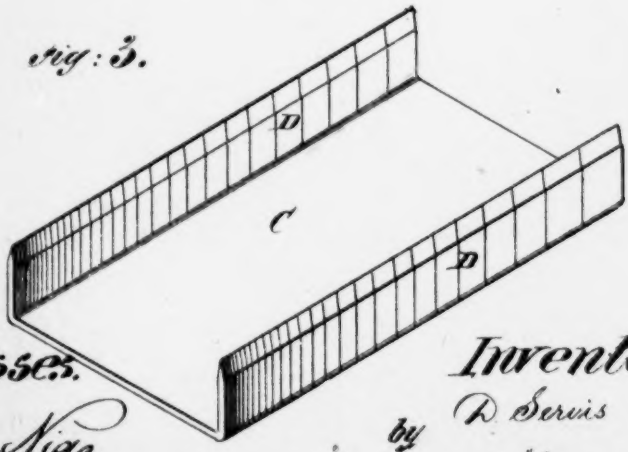


Fig: 3.



Witnesses.
Chas Nida.
C. Sedgwick

Inventor:
by D. Servis
Munn & Co
Attorneys.

UNITED STATES PATENT OFFICE.

DAVID SERVIS, OF SENNETT, ASSIGNOR TO THE SERVIS RAILROAD TIE PLATE COMPANY, OF NEW YORK, N. Y.

WEAR-PLATE FOR RAILROAD-TIES.

SPECIFICATION forming part of Letters Patent No. 294,816, dated March 11, 1884.

Application filed February 18, 1882. Renewed November 14, 1882. (No model.)

To all whom it may concern:

Be it known that I, DAVID SERVIS, of the town of Sennett, in the county of Cayuga and State of New York, formerly residing in the city, county, and State of New York, have invented certain new and useful Improvements in Wear-Plates for Railroad-Ties; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention has for its object the provision of a wear-plate for the cross-ties of railroads of such construction that it may be cheaply made, readily applied without injury to the wooden cross-tie, and effectually operate as an elastic or cushioning support for the rail, whereby a comparatively inexpensive provision is made against the shearing action of the metal rails upon the cross-ties, and the destructive effect of the vertical play of the rails, caused by the movement of the rolling-stock over them, is wholly overcome.

To these ends the improvements consist in a wear-plate composed of a flat or comparatively flat body portion provided at its opposite sides with depending edge-flanges that are adapted to enter the wooden-body of the cross-tie without injuring the same, which flanges are relatively parallel and lie in planes approximately at right angles to that of the said body portion.

A practical embodiment of the invention is illustrated in the accompanying drawings, wherein Figure 1 represents by a plan view a portion of a railroad-track supplied with my improvements. Fig. 2 represents the same by a sectional elevation taken on the line *x* of Fig. 1; and Fig. 3, by a perspective view, represents the wear-plate detached and inverted.

The railroad-track is shown as composed of cross-ties B, properly bedded, upon which the longitudinal metal rails A are supported, said rails being secured to the ties by spikes driven into the ties, so that their heads overlap the flange of the rail. Beneath the rails, at the points where they overlie the cross-ties, wear-plates C are secured to form rail-seats, as is well shown in Fig. 1. These wear-plates C each consists of a body having approximately right-angular edge-flanges D projecting at opposite sides, (see Fig. 3,) said flanges preferably having sharpened edges provided by beveling one or both sides of their edges, though said flanges may be of tapered form. The wear-plates may be of any convenient width to afford a good bearing for the rail, and will be made long enough to project some distance at opposite sides of the rail beyond its bottom flange, and their depending flanges D may be of a size to extend more or less into the tie, made necessary or desirable by the quality or character of the wood composing the tie.

In their practical use, these wear-plates are applied to the tie at the proper points near each of its ends to afford seats for the rails, their flanges D being sunk longitudinally into the wooden tie, or so as to be parallel with the grain or fiber of the wood, as best shown in Fig. 2. When thus attached to the tie, the body of each wear-plate will lie parallel with the horizontal top surface of the tie, and the flange D, entered into the body of the tie, will be impinged upon by the parted fibers of the wood in such manner as to be elastically held in place. As the rails move and apply pressure to the top surface of the wear-plates, each plate will, by reason of its flanges being firmly embraced or clasped by the fibers of the wooden tie, move very slightly, and act as an elastic seat or cushion to receive the sudden or percussive pressure exerted by the heavy and rapidly-moving rolling-stock passing over the rails. As the flanges D are integral with the body of the wear-plate, are extended longitudinally in their seats in the tie, and are embraced on both sides by the fibers of the wood, the bearing force exerted upon the said plate will not only be distributed throughout a larger surface than when the rails rest directly upon the top surface of the tie B, but the wear-plates will gently move as they receive and are released from the said pressure, the elastic cushion thus provided and its great extent operating to prevent any shearing action of the plate, which latter being interposed between the rail and the tie, and acting to transfer the pressure of the rail upon the tie from a transverse direction to a longitudi-

nal one, prevents the possibility of the rail shearing or cutting the tie. By locating the depending flanges D directly at the edge of its body, no projection beyond the sides of the wear-plate exists, the pressure of which would act as a lever, causing the wear-plate to tilt as it receives pressure from the onward-moving rolling-stock, and thus operate not only to loosen it from its seat, but to injure the tie.

The structure of these wear-plates is such that they may be cheaply produced, as their simplicity enables them to be made by the ordinary rolling process or from the metal plates of commerce by the common swaging operation, that process only being necessary to the formation of their side flanges, D.

A perfect preservation of railroad-ties for a long period of time is accomplished by the use of these wear-plates, and these improvements also enable the use of railroad-ties composed of cheap timber.

Where it is desired to apply these improvements to a railroad already laid, it is practicable to insert the wear-plates into the ties without detaching the rails by providing the plates with a beveled end, which form enables them to be readily driven under the rail and into the tie, though this may be done by the exercise of slight skill with the form shown.

The preferable form of the plate is the narrow structure shown, in the use of which the rail is independently secured to the tie by spikes driven at a point clear from the wear-plate; but, if desired, a wide wear-plate constructed with spike-holes may be used, in which case the spikes fastening the rail to the tie may be passed through the wear-plate and into the ties.

This wear-plate is especially useful for supporting movable rails, as in switches, for the reason that it is not liable to be bent or become loosened by the movements of the rails.

What, therefore, is claimed is—

1. A wear-plate for railroad-ties, consisting of a body having projecting flanges at its side edges, said flanges being sharpened to adapt them to be forced into the tie, substantially as described, and for the purpose set forth.

2. The combination, with a railroad-rail and supporting cross-tie, of a wear-plate consisting of a body having projecting flanges at its side edges, said plate being interposed between the rail and tie, with its flanges entered into the tie longitudinally or parallel with the grain or fibers of the wood composing the tie, substantially as described.

3. In a wear-plate for railroad-ties, the combination, with the side edges of the plate C, of flanges D, having sharpened edges, substantially as herein shown and described, whereby the said plate will be strengthened to sustain a downward pressure, and may be readily forced into the tie lengthwise of the grain of the wood, as set forth.

DAVID SERVIS.

Witnesses:
JAMES T. GRAHAM,
EDGAR TATE.

23 & 1724

EXHIBIT So.

KATE S. HOLMES,
Notary Public.

(No Model.)

C. FISHER.

RAIL JOINT.

No. 313,067. Patented Mar. 3. 1885.

Fig. 1.

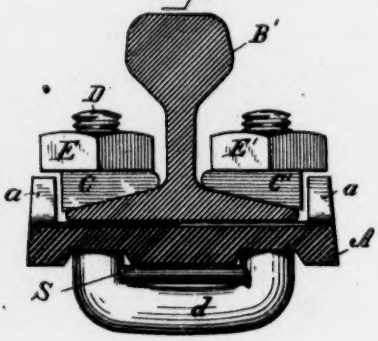


Fig. 2.

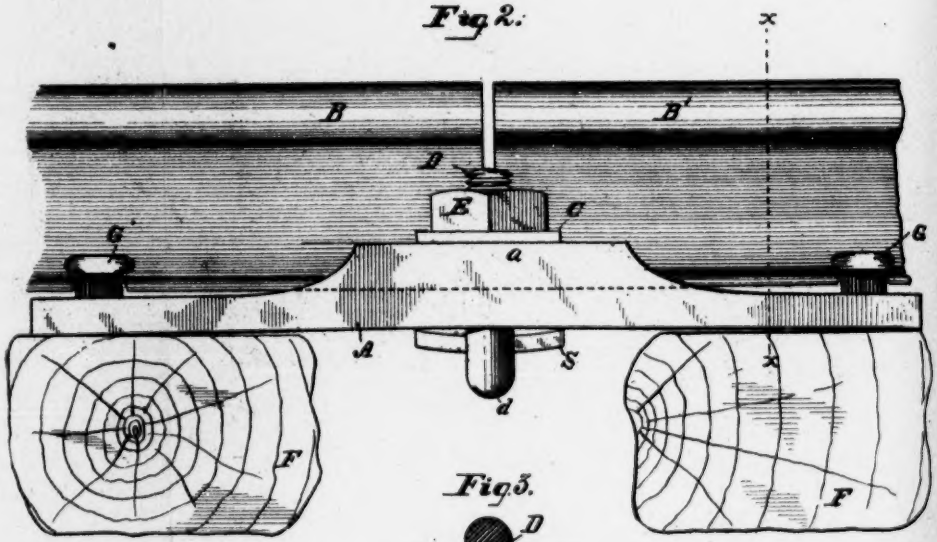


Fig. 3.

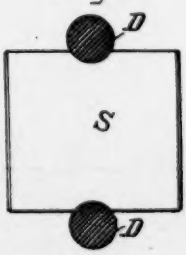


Fig. 4.

Clark Fisher

INVENTOR

By his Attys

H. C. Strawbridge

J. Bonsall Taylor

WITNESSES:

H. H. Bates

John Dolleyster

UNITED STATES PATENT OFFICE.

CLARK FISHER, OF TRENTON, NEW JERSEY.

RAIL-JOINT.

SPECIFICATION forming part of Letters Patent No. 313,067, dated March 3, 1885.

Application filed November 1, 1884. (No model.)

o all whom it may concern:

Be it known that I, CLARK FISHER, a citi-
en of the United States, residing at Trenton,
ew Jersey, have invented new and useful
mprovements in Rail-Joints, of which the fol-
owing is a specification.

The object of this invention is to improve
pon what is known as the Fisher rail-joint,
or which Letters Patent of the United States,
o. 19,555, were, upon March 9, 1858, granted
o M. Fisher, of Trenton, New Jersey. The
isher rail-joint, which relates to a class of
evices known as "joints" or "splices" for the
eception and secure fastening of contiguous
nds of rails, consists of a sole piece or chair
rovided with flanges upon each side of its
pper surface, against which flanges and upon
e upper face of which chair-clamps or fore-
cks, to grasp the base of the rail ends, rest,
nd of one or more U-bolts the transverse or
ridge portions of which lie beneath the chair
nd the bases of the rails, and the arms of
hich pass up to the side of the rail-bases and
rough the forelocks, and are provided with
uts, which screw down upon the forelocks,
o as to hold the latter down upon the rail-
ases and the chair, as by a reference to said
etters Patent, will be understood.

My invention is also applicable to and for
se in connection with a certain rail-joint in-
ented by me and patented to me in and by
etters Patent No. 214,032, granted April 8,
879, in which the essential feature of novelty
as a sole-piece or rail-joint chair arched in
e direction of its length, so as to be adapted
support the rails beneath their intersections
pon its highest portion, and to rest, as to its
xtremities, upon the ties.

The specific object of my present improve-
ents is to so construct the old Fisher rail-
int as, first, to provide for automatically
king up any wear of the various horizontal
rfaces, which are held together in contact
y the U bolt or bolts; second, to insure to
ese bolts a certain amount of elasticity, with-
ut which the bolts are too rigid and unyield-
g, this elastic tension thus imparted inci-
entally aiding to prevent the unscrewing of
e nuts of the bolts; third, to furnish a bet-
r wearing-surface of steel under the chair
nd between it and the cross-head of the bolt;
and, fourth, to distribute the strains coming upon the bolt to a region on either side of and at right angles to the cross-head of the bolt, and at some distance from the said cross-head.

To the above end my invention consists in devices, a preferred form of a convenient embodiment of which is represented in the accompanying drawings and described in this specification, the particular subject-matter claimed upon being hereinafter definitely specified.

In the drawings, Figure 1 is a transverse sectional elevation through a rail-joint embodying my improvements, section being supposed in a plane of the dotted line *x x* of Fig. 2, and sight being taken from the right hand of said Fig. 1. Fig. 2 is a side elevation of the devices represented in Fig. 1. Fig. 3 is a top plan view of the spring bearing-piece, the arm of the bolt being sectioned; and Fig. 4 is a perspective view of the spring bearing-piece.

Similar letters of reference indicate corresponding parts.

In the drawings, A represents the sole-piece bridge or chair, the flanges of which are designated by the letter *a*. B B′ are the meeting ends of contiguous sections of rails. C C′ are the forelocks. D is the U-bolt, one only being shown. E E′ are the nuts with which the threaded arms of the bolt are provided. F are the ties upon which the sole-piece or flanged beam rests, and G are the spikes by which the said beam is secured to the ties.

All of the foregoing devices are component elements of the original Fisher joint.

The sole-piece represented in the drawings is slightly arched in the direction of its length, after the manner of the improved sole-piece of my Letters Patent No. 214,032. It is not, however, essential that the sole-piece should be arched, although I prefer such construction.

S is an elliptic spring bearing-piece of heavy steel interposed between the under surface of the sole-piece or bridge and the upper surface of the cross-head *d* of the U-bolt. This bearing-piece is of sufficient strength to take up any wear in the forelocks, rails, and bolt, nearly equals in compressibility the strain on the bolt when the nuts are fully screwed up, prevents any slackening of the strain, and serves also to impart additional elasticity ver-

tically to the device as an entirety, tending to neutralize such small jarring strains as the bolt is subject to.

It is obvious that, should more than one U-bolt be employed, either a separate spring bearing-piece may be applied to each, or a longer spring bearing-piece common to all the bolts be employed.

The bolt may be slightly notched for the reception and more certain retention of the bearing-piece, or notches S, Fig. 4, may be made in the edges of the bearing-piece.

The bearing-piece assists to retain the forelocks down upon the bases of the rails, adding to the strength and solidity of the joint.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. A steel spring bearing-piece interposed between the under face of the sole-piece and the cross-head of the U-bolt of the Fisher rail-joint, substantially as and for the purposes set forth.

2. The combination of the sole-piece, rails, forelocks, U-bolt, nuts, and spring bearing-piece, substantially as and for the purpose set forth.

In testimony whereof I have hereunto signed my name this 18th day of October, A. D. 1884.

CLARK FISHER.

In presence of—
ISAAC F. RICHEY,
THEO. C. MAPLE.

29 & 1730

EXHIBIT S9.

KATE S. HOLMES,
Notary Public.

(No Model.) 2 Sheets—Sheet 1.

A. M. TRUDE.

RAILROAD TRACK FASTENING.

No. 329,867. Patented Nov. 3, 1885.

Fig. 1.

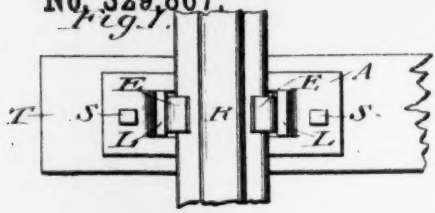


Fig. 4.

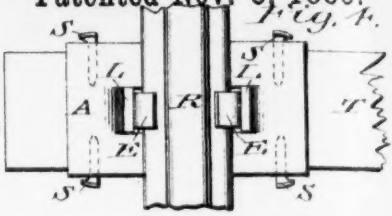


Fig. 2.

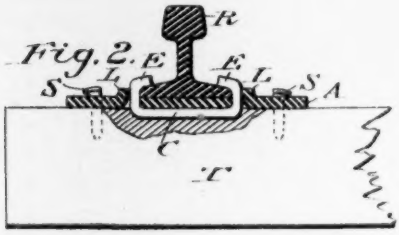


Fig. 5.

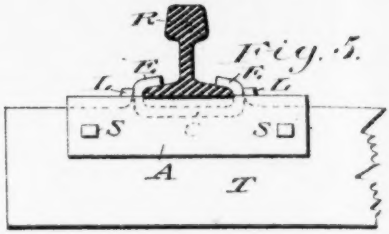


Fig. 6.

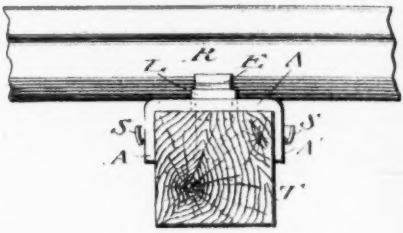


Fig. 3.

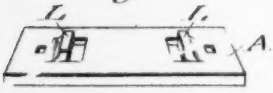


Fig. 7.

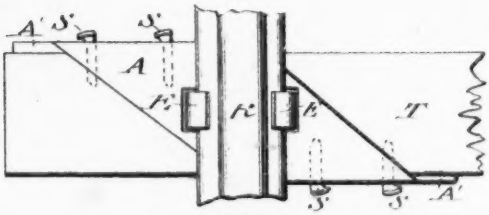
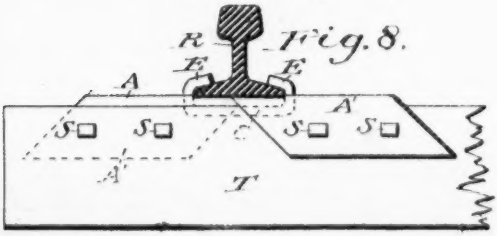


Fig. 8.



Witnesses.

C. O. Palmer

O. Tyberg

Inventor

A. M. Trude

By F. H. Richards

Atty

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(No Model.) 2 Sheets—Sheet 2.

A. M. TRUDE.

RAILROAD TRACK FASTENING.

No. 329,867. Patented Nov. 3, 1885.

Fig. 9.

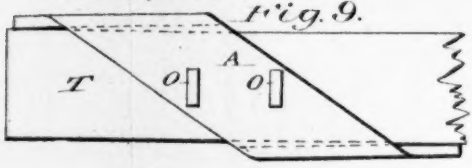


Fig. 10.

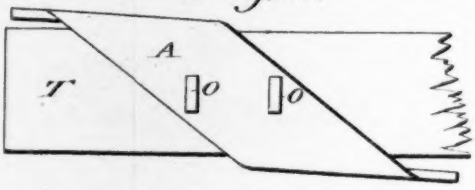


Fig. 11.

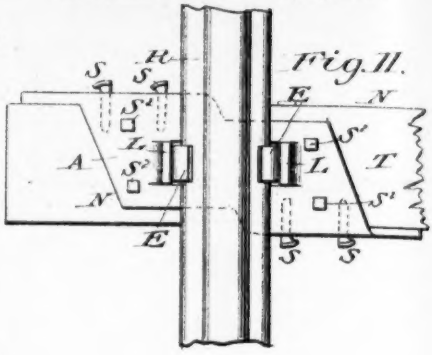


Fig. 12.

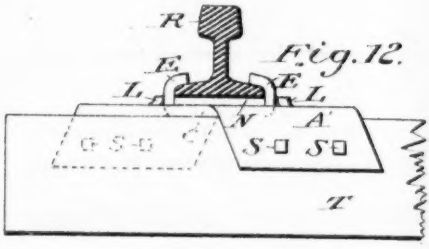


Fig. 15.

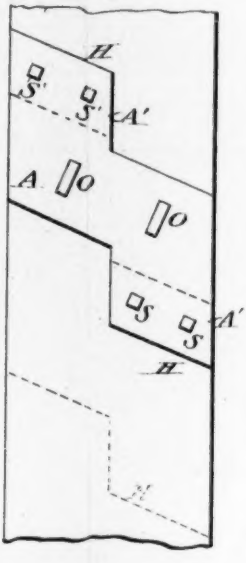


Fig. 14.

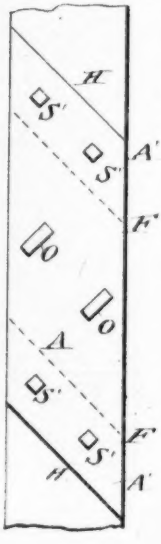
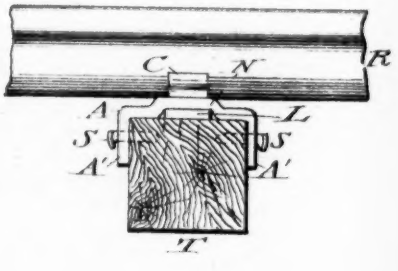


Fig. 13.



Witnesses:
C. O. Palmer
O Tyberg

Inventor.
A. M. Trude.
By F. H. Richards, Atty.

UNITED STATES PATENT OFFICE.

ARTHUR M. TRUDE, OF HARTFORD, CONNECTICUT.

RAILROAD-TRACK FASTENING.

SPECIFICATION forming part of Letters Patent No. 329,867, dated November 3, 1885.

Application filed October 30, 1884. Serial No. 146,854. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR M. TRUDE, of the city and county of Hartford, State of Connecticut, have invented certain new and useful Improvements in Railroad-Track Fastenings, of which the following is a specification, reference being had to the accompanying drawings, and to the reference-characters marked thereon, forming a part thereof, in which—

Figure 1 is a plan view of a portion of a railroad-track having fastenings embodying a portion of my improvements, being the most simple form thereof. Fig. 2 is an end elevation of the same, (being viewed from the end of the rail,) partially in section, drawn in projection to Fig. 1. Fig. 3 is a perspective view of the form of plate shown in Figs. 1 and 2. Fig. 4 is a plan view similar to Fig. 1, showing the plate extending over the sides of the tie. Fig. 5 is an end elevation of the same drawn in projection to Fig. 4. Fig. 6 is a side elevation of the same, partially in section, drawn in projection to Fig. 5. Fig. 7 is a plan view of a modification of the form of fastening shown in Figs. 4, 5, and 6. Fig. 8 is an end elevation of the form shown in Fig. 7. Figs. 9 and 10 are plan views illustrative of the object of the improvement shown in Figs. 7 and 8. Fig. 11 is a plan view showing a further modification in the form of the plate. Fig. 12 is an end elevation of this improved form, and Fig. 13 is a side elevation of the same. Fig. 14 shows the manner of cutting from a strip of metal the form of plate shown in Figs. 7 and 8; and Fig. 15 shows the manner of cutting from a wider strip the form shown in Figs. 11, 12, and 13.

Similar characters refer to similar parts throughout the several views.

This invention relates to improvements in devices for fastening together the rails and cross-ties of railroads in a superior manner, the object being to provide means for making such fastenings more secure, and to prevent the ties from being so rapidly destroyed by the driving of spikes, abrasion, and decay.

The invention consists in certain devices and combinations, which will be first described in connection with the drawings, and afterward pointed out in the claims.

When railroad-rails are laid directly on the cross-ties, this being the ordinary manner of laying them, the passage of trains produces a violent grinding action between the rail and the tie, which rapidly wears away the rail-seat, allowing the rail to sink down into the channel thus formed in the tie, and away from the heads of the spikes, which must then be driven deeper into the wood.

My invention overcomes the aforesaid difficulty by furnishing an inexpensive re-enforcing plate adapted to be placed between the rail and cross-tie for withstanding that grinding action. This plate, in its simplest form, is shown at A in Figs. 1 and 2, being a plain rectangular plate perforated for spikes S, whereby said plate is secured to tie T, and for a rail-holding clasp, C, for holding down the rail R, and having abutments for supporting the said clasp. These perforations or openings (see O, Figs. 14 and 15) are situated on either side of the rail-seat, and the clasp lies with its middle portion underneath the plate, its ends E extending up through said openings and closing down onto the flanges of said rail.

The clasp-openings are best made by cutting the plate on three sides of the required opening and turning up the metal to be removed, so as to form lips or abutments L. The object of these abutments is to assist the clasp in resisting the forces tending to produce a lateral displacement of the rail.

When the spikes for holding down the plate (or the rails when plates are not used) are driven into the top of the ties, as heretofore practiced, water readily finds its way down beside them. This, together with the action of the sun, induces decay, thereby reducing the firmness of the wood around the spikes and destroying the security of the rail-fastening. This necessitates a frequent changing of the spikes to new positions, which soon destroys the tie in that part where the plate or rail is secured to such an extent that the whole tie is rendered useless, although it may still be sound enough elsewhere. To prevent the so rapid destruction of cross-ties from this cause, I make the aforesaid plate wider than the tie and bend the edges thereof downward upon one or both of the sides of said tie, and then secure the plate to the tie by spikes driven through holes in these downwardly-

projecting flanges into the sides of said tie. This additional improvement is shown in Figs. 4, 5, and 6, A′ being the flanges referred to. The spikes being now horizontal, or nearly so, the water obviously has less tendency to follow into the tie beside the spike than it has to run out, and thus cannot settle, as before, in the spike-holes.

As ordinarily laid railroad-rails are held down merely by the friction of the spike in the wood, so that if the spike becomes loosened by the decay of the tie around, as aforesaid, or otherwise, there is nothing to prevent said rail from being lifted vertically from the tie. By driving the spikes into the sides of the tie horizontally through the plate-flanges, as provided for by my invention, as aforesaid, any force tending to lift the rail—said rail being secured to the plate as described or by other equivalent means—is resisted by the flanges drawing against the under side of the spikes after the manner of what is called a "shearing-strain." In this case the spikes may be loosely held into the tie and yet act with full effect to hold down the plate and rail.

For fastening the rail to the plate, I prefer to employ a stout ⊔-shaped clasp, as before briefly described, the ends of which project up through the openings in said plate on each side of the rail-seat, and which are adapted to be bent down onto the flanges of the rail by blows from the track-layer's hammer. By this construction of fastening, using a clasp separate from the plate, the most suitable material may be used for each part. Another advantage is that when one part is broken or otherwise destroyed it may be replaced without renewing the entire fastening.

My improved track-fastening is designed more especially to be used on cross-ties having a rectangular cross-sectional form, usually prepared by sawing them to an approximately-uniform size. It is well known, however, that such cross-ties will, owing to imperfect workmanship and shrinkage, vary slightly in size, so that a plain flanged plate, as shown in Figs. 4, 5, and 6, will not exactly fit all of them. This imperfection of fitting is usually slight, and if the plate is not too thick the flanges are readily closed onto the wood by means of the spikes; but I prefer to secure the proper fit of the flanges to the tie by an additional improvement. (See Figs. 7 and 8.)

This improvement consists in such a construction of the plate that the flanges thereof shall be situated from each other in a direction diagonally to the tie, and preferably so that one flange shall be on the inside while the other is on the outside of the rail. When so constructed, if the tie is either too wide or too narrow the plate may be slightly turned or swung on the top of said tie and the flanges drawn close to the sides thereof by driving home the spikes. This is shown in Figs. 9 and 10, showing, respectively, a tie too narrow and one too wide. In its simplest form this style of plate is a plain strip with the ends cut off parallel to the folding-line. This is illustrated by Fig. 14, in which F F are the folding-lines and H H the end of a plate. The plates having been severed from the strip by diagonal cuts, the clasp-openings O and the spike-holes S, Figs. 14 and 15, are made, and the plate finished by properly bending the flanges at the said folding-lines.

It will be understood that the form of plate may be modified in various ways to a considerable extent without effecting the novel features of my improved track-fastening; but there is one modification which I consider an improvement over the form last above described. This modification is shown in Figs. 11, 12, and 13, the manner of cutting the same from a strip of metal being shown in Fig. 15, which corresponds (except in the shape of the plate) to Fig. 14. The diagonal cuts are here made to have a zigzag course across the strip, so that, without using a greater amount of metal for the plate, there is more width of metal outside of the clasp-holes O than is shown in Fig. 14. Another advantage is that the flanges may be more nearly vertical to the top of the tie and the extreme length of plate be less.

As hereinbefore described, that part of the plate A lying on the top of the tie is flat in one plane, and the middle portion of the clasp underneath said plate lies in a cavity formed in the tie. This, especially if the ties are made of hard wood, is not always convenient, and I therefore in such cases construct the plate with another additional improvement, which improvement consists in constructing the plate with its middle portion, N, elevated above the marginal parts thereof, so as to form a recess therein for receiving the middle part of the clasp. This is plainly shown in Figs. 11, 12, and 13, the top of said elevated portion forming the rail-seat.

It will be understood that bolts or any other suitable form of rail-holding device can be substituted and are equivalents for clasp C (the openings O being suitably modified) in some of those combinations claimed in which the plate A has flanges; but I prefer the clasp because of its simplicity and cheapness and of its less liability of being loosened accidentally. In practice, for greater security, I prefer to use two spikes in each flange, in which case it is sufficient to make them each about one-half the weight of spikes now generally used. This I consider favorable, as small spikes are of course much less destructive to the tie than larger ones. In exceptional instances it may be necessary, as when laying track around sharp curves, to use more spikes than are in the flanges to prevent lateral displacement of the rails. In this case they may be driven through holes in the top of the plate, as shown at S^2, Fig. 11; but this is usually unnecessary.

It is obvious that screws or bolts may be used in place of spikes whenever desired, these being well-known equivalents for each other.

1114

Having now described my improved railroad-track fastening, what I claim to be new, and therefore desire to secure by Letters Patent of the United States, is—

1. An improved article of manufacture consisting of the cross-tie re-enforcing plate herein described, (see Figs. 1, 2, and 3,) the same being a plate having clasp-openings O, and having abutments L formed of the metal removed in making said openings, substantially as set forth.

2. The combination, in a railroad-track, of a flanged rail, a wooden tie underneath and supporting said rail, a metal plate between said rail and said tie having two openings, one on each side of said rail, substantially as described, and having perforated flanges extending down over the sides of said tie, a metallic clasp having its middle portion inclosed in a cavity or recess formed between said tie and said plate, and having its ends extending up through the openings in said plate and closed down on said rail, and spikes passing horizontally through the perforations of said flanges into said tie, all substantially as and for the purpose described.

3. The combination, in a railroad-track, of a railroad-rail, a wooden tie underneath and supporting said rail, a metal plate between said rail and said tie, provided with a rail-holding device, substantially as described, said plate extending diagonally across said tie and having perforated flanges extending down over the sides thereof, and a series of spikes passing horizontally through the perforations of said flanges into said tie, substantially as and for the purpose specified.

4. A railroad-cross-tie re-enforcing plate, as A, Figs. 4, 5, and 6, having flanges adapted to extend down onto the sides of the tie, said plate perforated for spikes situated horizontally, and having openings for a rail-holding device, substantially as described.

5. A railroad-cross-tie re-enforcing plate, as A, Figs. 4, 5, and 6, having flanges adapted to extend down onto the sides of a tie, and perforated for spikes situated horizontally, said plate having openings for a rail-holding clasp, and abutments for supporting said clasp, all constructed and arranged substantially as described.

6. A railroad-cross-tie re-enforcing plate constructed to lie diagonally across said tie, and having flanges one on either side of said rail, said plate being formed by severing it from a strip by a zigzag cut, substantially as shown and described.

7. The combination of the wooden cross-tie F, the plate A, having openings O and abutments L, as shown and described, the holding devices, substantially as described, for holding the plate to the tie, and clasp C, bent over the rail-flanges and supported by said abutments, substantially as set forth.

8. A railroad-cross-tie re-enforcing plate, as A, Figs. 7 and 8, having flanges adapted to extend down onto the side of a tie, and perforated for spikes situated horizontally, said plate being fitted to the tie obliquely, so that said flanges rest on said tie at different points in its length, all substantially as set forth.

In testimony whereof I have hereunto subscribed my name, at Hartford aforesaid, this 30th day of September, A. D. 1884.

ARTHUR M. TRUDE.

Witnesses:

A. P. MOORE,

C. H. COOLEY.

1116

(No Model.)

W. GOLDIE.

RAILWAY RAIL CHAIR OR FASTENING.

No. 356,760. Patented Feb. 1, 1887.

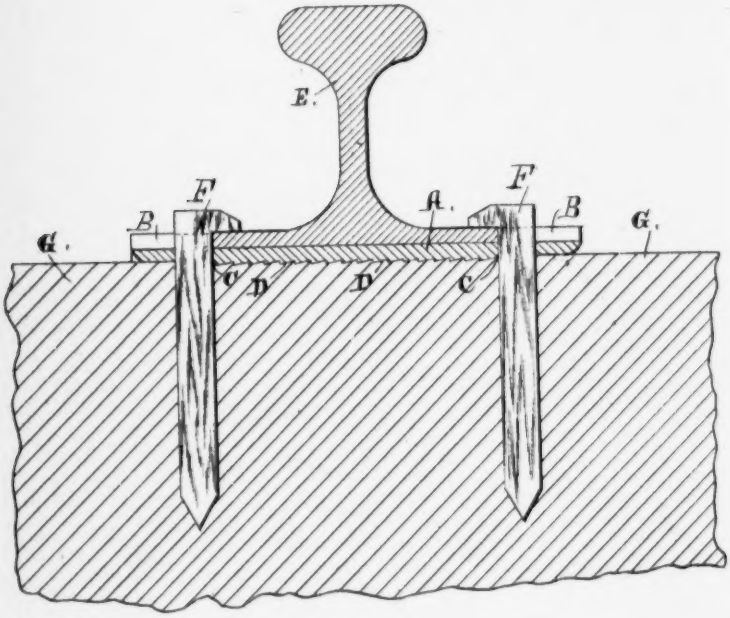


Fig. 2.

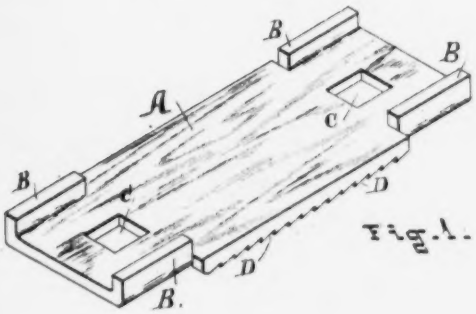


Fig. 1.

Attest:

J. E. Thomas

W. H. Power

Inventor

William Goldie

UNITED STATES PATENT OFFICE.

WILLIAM GOLDIE, OF WEST BAY CITY, MICHIGAN.

RAILWAY-RAIL CHAIR OR FASTENING.

SPECIFICATION forming part of Letters Patent No. 356,760, dated February 1, 1887.

Application filed September 9, 1886. Serial No. 213,165. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GOLDIE, a citizen of the United States, residing in West Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Railway-Rail Chairs, of which the following is a full, clear, and exact description, which will enable others skilled in the art to make and use the same.

Heretofore the permanent way of railways has been divided into two great classes, viz: that in which the rail is fastened directly to the wooden tie or sleeper and that in which the rail is fastened to a heavy iron casting technically called a "chair," and the chair secured to the tie by spikes. The first system, while it has the merit of cheapness in the beginning, is very expensive in the end, owing to the heavy expense incurred in keeping the rails in line, because the strain is nearly all directed upon the spikes upon the outside of the rails, as the crowding action of the flanges of the wheels has a constant tendency to spread the rails and no tendency whatever to draw them together, and this is the force that causes the numerous accidents from spreading of the rails, which are both costly and dangerous to life. Another defect of this system is that the spikes having nothing to hold them up to their work and in close contact with the rail are very irregular in their bearings against the rail, a portion of them bearing very hard against it, while others do not touch it at all, and the consequence of this is that the necks of the spikes which bear hard against the rail are rapidly cut away with the extreme friction and grit always present on the track, while the others fail entirely to accomplish the end for which they were intended, and thereby diminishing the usefulness of the available means employed at least seventy-five per cent. The use of the chair is confined to roads where the high price of ties counterbalances the extremely high cost of laying a track with the chairs as a rail-fastening—an expense which has been materially augmented by the erroneous principle involved in their construction. In all the chairs heretofore made the idea appears to have been held that bulk must give strength, and hence all the chairs are bulky, heavy, and cumbersome, extending over a large area on the tie, and from their rigidity, large bearing on the tie, and the brittle nature of the substance employed (cast-iron) they require a special dressing of the tie to give them a level and uniform bearing. As the rail is strong enough to resist deflection between the ties, so the tie is strong enough to support the rail. Therefore the only effective work performed by the ordinary chair is to equalize the pressure upon the spikes, and when the chair is let into the tie it operates to transfer the lateral pressure to the shoulder on the tie.

The objects of my invention are to accomplish all these ends in a much more economical manner and to construct a spike-binder of such a form that all unnecessary weight and area is avoided, which does not require any special adaptation or dressing of the tie to place it in position, which will be convenient and handy in use and readily applicable to roads already built, and which will utilize the entire resisting power of the spikes and use the superincumbent weight of the passing train as an auxiliary in tending to hold the rail and binder in their places. I attain these objects by the device illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of my improved rail-chair or spike binder. Fig. 2 is a vertical section of the rail and tie and of my improved chair when in position for use.

G represents an ordinary railway-tie, and E is the rail to be secured thereto.

A is a plate or web of metal placed upon the tie and beneath the rail and with its ends extending beyond the rail and provided with the holes C, through which and into the tie are passed the spikes F, with the heads of the spikes catching over the flange of the rail. These holes C are of a proper distance apart to bring the spike-body to bear firmly against the flange of the rail, and stops B are formed on the corners of the plate A by turning up a portion of the side edges of the plate, so the turned-up portion or stops will be at right angles with the plate and with their upper edges nearly even with the upper side of the rail-flange, the inner ends of the stops being in alignment with the inner edges of the holes C and bearing against the edges of the rail-flanges. These stops operate to hold the plate in position in relation to the rail before the spikes are driven, and also to retain the rail in position

1118

should one of the spikes become broken or removed, as well as to assist in preventing undue wear upon the spike-body by the flange of the rail.

The under side of the plate, between the spike-holes C, is provided with serrations or teeth D, formed with one vertical and one inclined side, the vertical side being placed facing the outside of the track, and the inner end of the under side of the plate is slightly rounded, which allows the rails to be raised and the plate passed beneath with its rounded end forward, and on the plate being pushed to its proper position the rail drops between the stops B and is ready for the spikes.

It will be noticed that the leading feature of this invention is the thin metallic band, of limited area, connecting the two spikes together and drawing the rail up tightly to the stops, and from its limited area and thinness being adapted to be forced by the weight of the train into the face of the tie, and the serrations being formed with a ratchet-like tooth, the vertical side of which is placed toward the outside of the rail, thereby gives the greatest power of resistance against any force tending to spread the rails.

The entire thickness of the plate A should be about three-sixteenths of an inch, as I find this gives sufficient strength to properly inclose both spikes, and the width of the plate is about three inches, which brings the stops B in a proper position to allow a claw-bar to pass between the stops and grasp the spike for its removal from the tie.

The substitution of the stops B for the flanges used in all other chairs is one of the most valuable features of the invention, as it avoids all of the complications of fastening incidental to the use of other chairs, which have to be slipped on from the end of the rail or be constructed of two parts and secured to the tie by a greater number of spikes.

In other chairs the thickness of the flange on the chair requires the hole in the flange to be countersunk, in order to permit the spike to grasp the flange of the rail, and this construction renders the withdrawal of the spike from the tie very difficult, if not impossible, while by my arrangement the spike is as free to be grasped for removal as if driven directly into the tie without the chair. Other great advantages of this form of chair are that it is easily and quickly applied to roads that are already built, as by withdrawing the spikes from the tie the rail may be slightly sprung upward and the chair then pushed beneath the rail without entirely loosening the rails from the ties or changing their position, which avoids the expense of relining the track, and the spike-holes being of a uniform distance between and properly located to cause the spikes to bear firmly against the flanges of the rail it operates to cause such spike to bear firmly against the edges of the rail-flange, and attain the objects of holding and supporting the rail in the best manner, and the spikes being tied together by the plate, operate to distribute the spreading force of the flanges of the wheels upon both of the spikes instead of only on the outside spike, as is the result when the rail is spiked directly to the tie, which renders the plate particularly beneficial for supporting the spikes in curved portions of the track.

This spike-binder is not in any way designed to hold the rail to the ties or to support the weight of the rail, but is especially designed by its thinness and limited area to be forced into the tie by a passing train and allow the rail to be supported principally by the wood of the tie on each side of the spike-binder, which operates to avoid the noise of the moving train which occurs when the rails are supported by direct contact with solid metal fastenings.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A binder for railway spikes, consisting of a metal plate placed between the rail and tie, and with its ends extending on each side of the rail, and provided with holes for the rail-spikes, the said plate being of thin and narrow dimension, whereby it is forced into the tie by the passing train, substantially as and for the purpose herein set forth.

2. A binder for railway-spikes, placed between the rail and tie, and consisting of a thin and narrow plate of metal having its ends extending beyond the rail and provided with spike-holes, and having the side edges of the extended portions turned upward and forming guide-stops, as B, as herein described, and for the purpose set forth.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

WILLIAM GOLDIE.

Witnesses:
W. H. POWER,
J. E. THOMAS.

t 1746

EXHIBIT S10.

KATE S. HOLMES,
Notary Public.

1120

(No Model.)

C. FISHER.

RAIL JOINT.

No. 360,673. Patented Apr. 5, 1887.

Fig. 1.

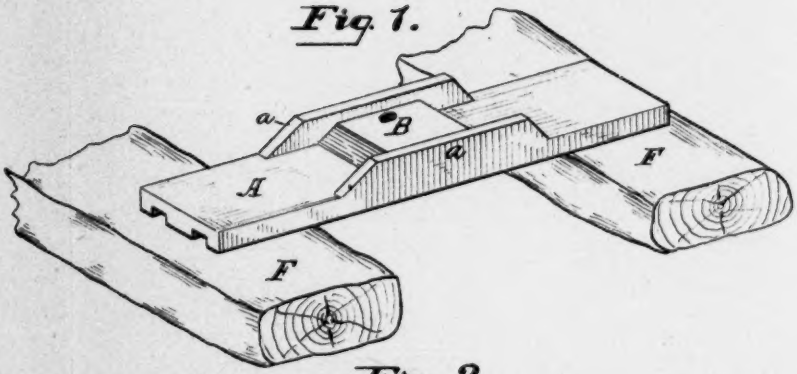


Fig. 2

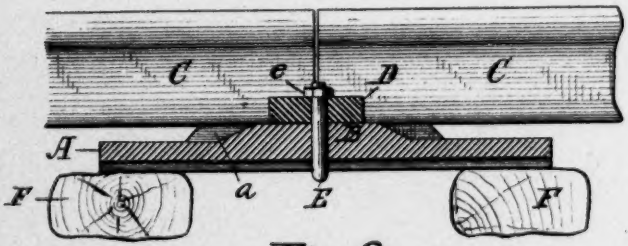


Fig. 3.

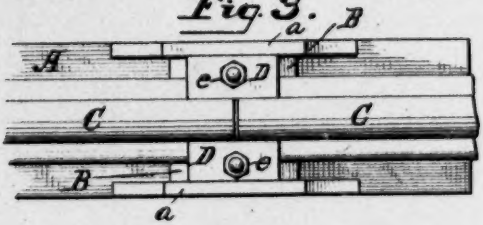
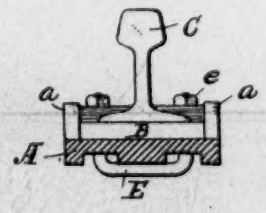


Fig. 4.



WITNESSES:

Edw. F. Greene

Edward H. Evans

INVENTOR

Clark Fisher

By his Attorneys

Wm. C. Strawbridge

J. Bonsall Taylor

UNITED STATES PATENT OFFICE.

CLARK FISHER, OF TRENTON, NEW JERSEY.

RAIL-JOINT.

SPECIFICATION forming part of Letters Patent No. 360,673, dated April 5, 1887.

Application filed May 17, 1886. Serial No. 202,415. (No model.)

To all whom it may concern:

Be it known that I, CLARK FISHER, a citizen of the United States, residing at Trenton, in the County of Mercer, and State of New Jersey, have invented certain Improvements in Rail Joints, of which the following is a specification.

This invention is an improvement upon that set forth in United States Letters Patent No. 19,555, granted March 9, 1858, to M. Fisher of Trenton, aforesaid, and known as the "Fisher Joint;" and it relates to the class of devices known as joints or splices for the reception of the contiguous ends of railroad rails and commonly called "rail joints," the same being devices for connecting the rails and for supporting them both from beneath and laterally.

The Fisher rail joint referred to consists of a sole-piece or chair provided with longitudinally extending vertical flanges upon each side of its upper surface, against which flanges and upon the upper surface of which sole piece clamps or fore-locks to grasp the bases of the rail ends rest, the said fore-locks being held down upon the rail bases and sole piece by one or more bolts passing through the whole, as by a reference to the Letters Patent referred to will more fully appear.

Formerly the sole pieces of these joints were made as a flat or level plate of uniform thickness, and in practical use it was found that, under their passage, the pressure or weight of the wheels of trains came first upon one end of the sole-piece, the resulting tendency being to spring the other end and thereby loosen the fastenings.

To obviate the foregoing disadvantage I devised the rail joint described and claimed in United States Letters Patent No. 214,032, granted to me April 8th, 1879, in which the invention consisted in giving to the chair or sole piece of the Fisher joint a slightly arched or curved form in the direction of its length, the convexity being on top, so that the butts or meeting extremities of the rails came together and rested upon the highest part of the arched sole-piece, with the result that the weight passing over the joint was from first to last thrown upon the center thereof, thereby distributing the pressure evenly throughout the joint and to the ties or other bearings upon which the ends of the sole-piece rested.

Some disadvantages in this arrangement are found in practice; these are that while the supporting ties are in the same horizontal plane on their upper bearing surfaces, the ends of the arched sole-piece or beam have a bearing on said ties only upon their extremities, a condition tending to cause the supporting ties to roll outwards, because the form of this arched beam on its under surface is similar to and parallel with its upper curved surface, and therefore it cannot bear evenly upon the plane surfaces of the ties. The central part of said beam or sole piece, moreover, which should be the strongest since it acts as a bridge from one tie to another, is, when not thicker than the parts which rest on the ties, weakened by the holes in it necessary for the vertical bolts.

The object of my present invention is to obtain in a flat or level chair or sole-piece the advantages incident to a chair, sole-piece, or beam arched in the direction of its length and adapted to support the rails beneath their intersections upon its highest portion and also to increase the strength of the central part of the beam, and these objects I obtain by superimposing upon the central portion of the sole-piece or chair of the Fisher rail joint between the flanges thereof a filling block or liner upon which the meeting extremities of the rails rest and upon which the forelocks are superimposed, all substantially as hereinafter set forth.

The rail joint embodying my invention is represented in the accompanying drawings and described in this specification, the particular subject matter claimed as novel being hereinafter definitely specified.

In the drawings,

Figure 1 is a view in perspective of a sole piece or chair embodying my improvements.

Figure 2 is a longitudinal side elevation of a rail joint embodying my improvements, section being supposed in the plane of the nearest arm of a connecting U-bolt.

Figure 3 is a top plan view of the rail joint of figure 2, and figure 4 a transverse sectional elevation in the plane of the dotted line $x \cdot x$ of figure 3, the rail not being in section.

Similar letters of reference indicate corresponding parts.

In the drawings, A is the sole-piece or chair, and *a* the laterally extending vertical flanges of the said chair; B is the central filling block

1122

or liner, which may be either cast, or forged, or rolled integral with the sole-piece, or be applied as a separate member thereto. It is preferably broad enough to fill the space between the flanges and long enough to afford a sufficient bearing for the rail ends. C are the rail ends; D the fore-locks and E a connecting U-bolt provided with nuts *e*. F are the ties. The chair is throughout its length flat on its under surface in the direction of its length, thereby securing to the joint as an entirety the advantage of a level and extended bearing upon each of the ties on which its extremities rest, and also by virtue of the liner a thickened bearing part, so to speak, for the rail ends, which increases its strength and prevents the rails from resting on other than the central portion of the beam. More than one U-bolt may, if desired, be employed, or separate and independent single bolts may be used.

Having thus described my invention, I claim:

1. In combination with a sole-piece or chair, a liner or filling block superimposed upon its carrying surface, rail ends resting upon said liner, fore-locks, and a connecting bolt or bolts, substantially as and for the purposes set forth.

2. In combination with a sole piece or chair, a liner or filling-block superimposed upon its upper or carrying surface, rail ends resting upon, attached to, and solely supported by said liner, forelocks, and a connecting bolt or bolts, substantially as and for the purposes set forth.

In testimony whereof I have hereunto signed my name this 13th day of May, A. D., 1886.

CLARK FISHER.

In the presence of
EDW. T. GREEN,
EDWARD W. EVANS.

1751 & 1752 EXHIBIT S11.

KATE S. HOLMES,
Notary Public.

1124

(No Model.)

J. W. CURRIER.

WEAR PLATE.

No. 379,210 Patented Mar. 13, 1888.

Fig. 1.

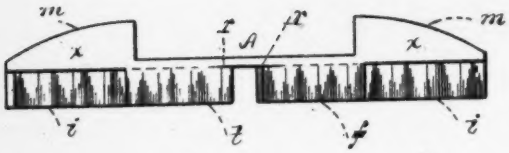


Fig. 2.

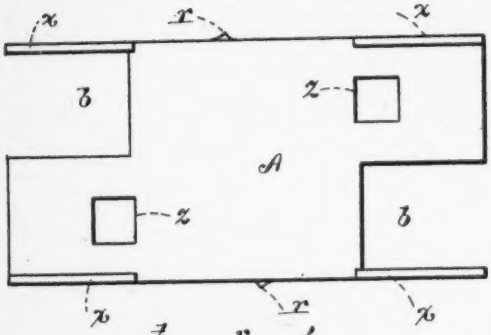


Fig. 3

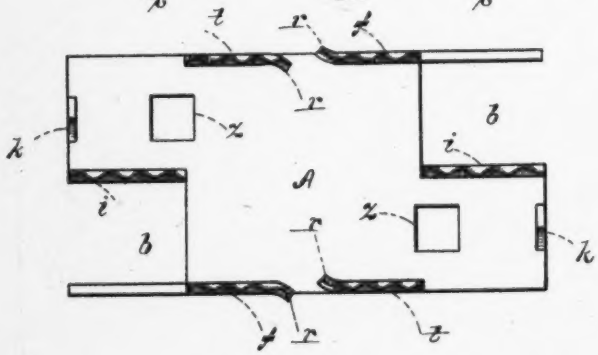
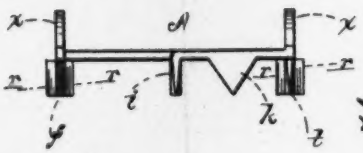


Fig. 4.



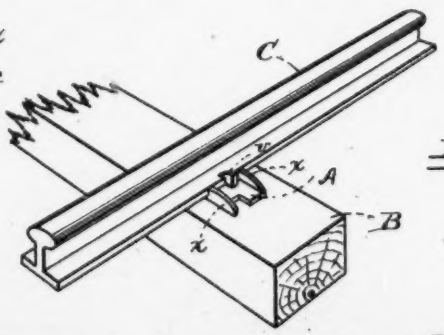


Fig. 5.

Witnesses:
Robt. H. Matthew
C. H. Gearney.

Inventor:
John W. Currier
per C. A. Seward & Co.
Atty's

UNITED STATES PATENT OFFICE.

JOHN W. CURRIER, OF NORTH TROY, VERMONT.

WEAR-PLATE.

SPECIFICATION forming part of Letters Patent No. 379,210, dated March 13, 1888.

Application filed January 17, 1888. Serial No. 261,929. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. CURRIER, of North Troy, in the county of Orleans, State of Vermont, have invented a certain new and useful Improvement in Wear-Plates, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of my improved wear-plate; Fig. 2, a top plan view; Fig. 3, a bottom plan view; Fig. 4, an end elevation, and Fig. 5 an isometrical perspective view representing the plate in position for use.

Like letters and figures of reference indicate corresponding parts in the different figures of the drawings.

My invention relates to that class of wear-plates which are employed on railways for preventing the rails from cutting into or wearing away the ties; and it consists in certain novel features, as hereinafter fully set forth and claimed, the object being to produce a simpler, cheaper, and more effective device of this character than is now in ordinary use.

The nature and operation of the improvement will be readily understood by all conversant with such matters from the following explanation.

In the drawings, A represents the body of the plate, which is provided with spike-holes *z*, and at both sides on its top with two upwardly-projecting flanges, *x*, which have their outer ends inclined downwardly, as shown at *m*.

Projecting downwardly at each side of the body A there are two vertically-arranged corrugated flanges, *t f*, the adjacent ends of which are bent laterally in opposite directions, as best seen in Fig. 3, the ends *r* of the flanges *t* being curved inwardly over the bottom of the body A and the ends *r* of the flanges *f* outwardly beyond the sides of said body.

Two centrally-disposed corrugated flanges, *i*, project vertically from the lower side of the body A near its center, as shown in Fig. 3, said flanges being arranged in parallelism with the flanges *t f*, and at either end of said body there is a downwardly-projecting spur, *k*. A portion of the body is cut away at each end, as shown at *b*, to reduce its weight, and all of the parts described, including the body A, flanges *x t f*, and spurs *k*, are cast integral or formed in one piece.

The object in corrugating the flanges *t f* is not to strengthen them, but to cause them to take a greater hold of the wood, which is forced into the corrugations as the flanges are driven into it, thereby greatly increasing the friction between the wood and flanges and preventing the plate from moving endwise when subjected to the lateral movement of the rail, the spurs *k* also serving to assist in firmly seating the plate and to hold it in position on the tie.

The object in curving the inner or adjacent ends, *r*, of the flanges *t f* to the right and left, as shown in Fig. 2, is to cause said flanges to offer a greater resistance to the endwise movements of the plate than they would otherwise afford when the plate is subjected to the strain caused by the lateral movements of the rail.

In the use of my improvement the plate is placed lengthwise on the tie B and the flanges *t f i* and spurs *k* driven into the tie until the body of the plate rests thereon, after which the rail C is placed on the plate between the flanges *x* and secured in position by ordinary rail-spikes, *v*, inserted in the holes *z* and driven into the tie, the heads of the spikes overlapping the lower flange of the rail in the usual manner.

The lower or outer ends of the flanges *t f i* are cast or formed thinner than their inner ends to enable them to be driven into the tie easily. The flanges *i*, being farther from a line drawn transversely through the center of the body A than the flanges *t f*, subserve in assisting to keep the plate from turning on its seat.

Having thus explained my invention, what I claim is—

1. In a wear-plate of the character described, a body having one or more flanges projecting from its lower side and adapted to be driven into the tie, said flanges being corrugated, substantially as and for the purpose set forth.

2. In a wear-plate, the body A, provided with the end flanges, *i*, substantially as shown and described.

3. In a wear-plate, the flange *t*, having its end *r* curved or bent laterally inward, substantially as described.

4. In a wear-plate, the flange *f*, having its

CLOSE IN CENTER

1126

end *r* curved or bent laterally outward, substantially as set forth.

5. In a wear-plate, the flanges *t f*, having their adjacent ends *r* curved or bent laterally in opposite directions, whereby said flanges are adapted to take a firmer hold of the tie, and thereby offer greater resistance to the lateral movements of the rail, substantially as described.

6. The improved wear-plate hereinbefore described, the same consisting of the body A, having the upwardly-projecting flanges *z*, holes *z*, downwardly-projecting corrugated flanges *t f i*, and spurs *k*, all being constructed and arranged substantially as shown and specified.

JOHN W. CURRIER.

Witnesses:
C. A. SHAW,
E. M. SPINNEY.

57 & 1758

EXHIBIT S12.

KATE S. HOLMES,
Notary Public.

1128

(No Model.)

A. COTÉ.

RAILROAD CHAIR.

No. 387,399. Patented Aug. 7, 1888.

Fig. 1.

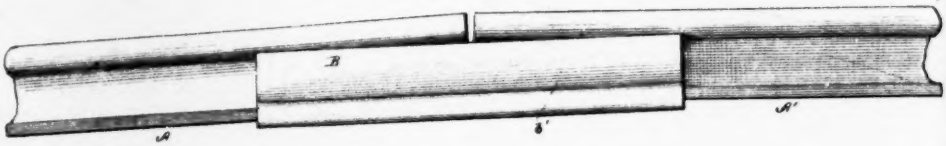


Fig. 2.

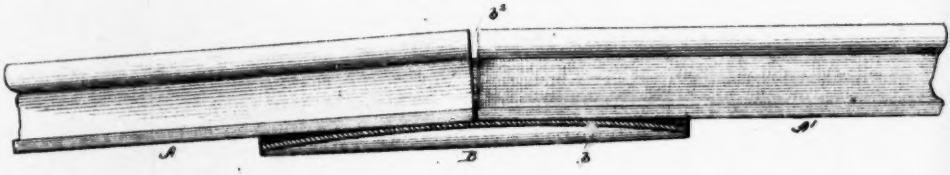


Fig. 3.

WITNESSES.

Edwin T. Yewell.

INVENTOR,

Alphonse Coté,

per Hallock & Hallock

1129

UNITED STATES PATENT OFFICE.

ALPHONSE COTÉ, OF GALWAY, NEW YORK.

RAILROAD-CHAIR.

SPECIFICATION forming part of Letters Patent No. 387,399, dated August 7, 1888.

Application filed October 7, 1887. Serial No. 251,714. (No model.)

To all whom it may concern:

Be it known that I, ALPHONSE COTÉ, a citizen of the United States, residing at Galway, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Railroad-Chairs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to chairs for railways.

The object of my invention is to provide a chair that will be more or less resilient, so that when secured to the rails the movement of the cars on the latter will not cause any jar or shaking by reason of the wheels passing over the ends of the rails secured within the chairs. In other words, the chairs are so constructed that the joints formed by the abutting rails will have an elastic bearing surface, which will give sufficiently when cars pass over it to prevent jarring of the cars and the noise consequent to said jarring.

My invention therefore consists of constructions and combinations, all as will hereinafter be described in the specification, and pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation; Fig. 2, a longitudinal section, and Fig. 3 a transverse section.

A A′ represent the abutting rails, and B the chair. This chair is formed of a single piece of resilient metal, wrought iron or steel being preferred for the purpose. It consists of a bottom or base, *b*, upon which the rails rest, and sides *b′ b²*, which clamp the sides of the rails. These sides are bent inwardly and have substantially but not the exact contour of the web and foot of the rail, and extend upwardly to the under side of the flange of the rails. The bottom or base of the chair is concave on the under side from edge to edge and convex on the upper side from edge to edge and arches from end to end, so that the crown of arch will be immediately under the abutting ends of the rails. The object of this concavo convex bottom or base is to give a flexible support for the base of the rails, so that as the car passes over the joint it will yield more or less, and thus prevent the jar which is usual when the chair is made of a rigid material. The slack of the spring is taken up by the bulging portion *b³*, which enlarges as the car passes over and prevents the chair from becoming broken. By making the bottom of the chair arching from end to end the meeting ends of the rails are slightly raised, so that the car will travel up a slight-inclined plane as it is leaving one rail and down an inclined plane as the wheels strike the abutting end of the next rail. This also adds to the resiliency of the chair, so that all the conditions necessary to prevent noise and jarring are produced. The chair is secured to the rails by bolts in the usual manner. By making the base and sides of the chair in one piece the strength of the joint is also increased and the chair will be able to support the rail if the support below be removed by any cause—such as fire or accidental displacement of the support.

What I claim as new is—

1. A chair made of resilient metal, having its bottom arched from end to end and its sides of substantially the same contour as the web and foot of a rail and extending upwardly to the under side of the head of the rail, substantially as described.

2. A chair made of resilient metal and having a concavo convex bottom arching from end to end.

In testimony whereof I affix my signature in presence of two witnesses.

ALPHONSE COTÉ.

Witnesses:
GEO. R. BYINGTON,
M. F. HALLECK.

1763 & 1764 U. S. Cir. Ct., Northern Dist. Ill., Eastern Div.

RAILROAD SUPPLY CO.

vs.

HART STEEL CO. & G. S. WOOD.

U. S. Cir. Ct., Northern Dist. Ohio, Eastern Div.

RAILROAD SUPPLY CO.

vs.

ELYRIA STEEL & IRON CO.

DEFENDANTS' EXHIBIT KKK.

KATE S. HOLMES,
Notary Public.

(No Model.) 3 Sheets—Sheet 1.

1131

E. H. ASHCROFT.

CONSTRUCTION OF RAILROADS.

No. 388,240. Patented Aug. 21, 1888.

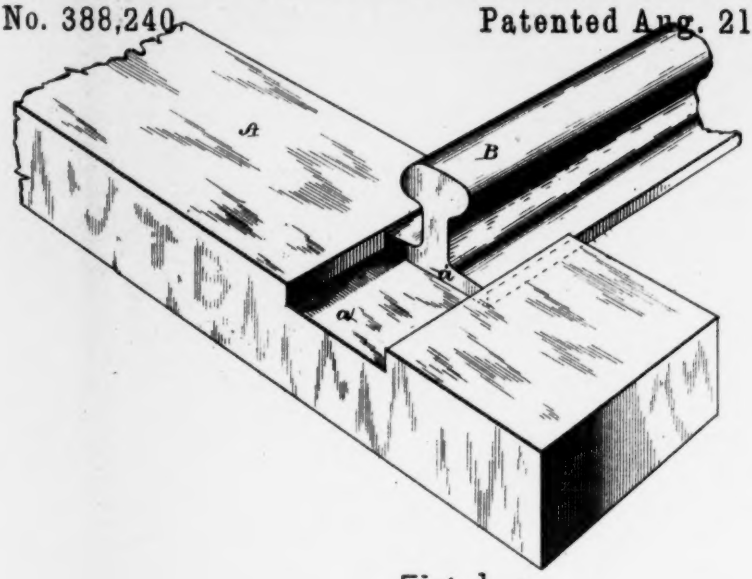


Fig. 1.

Fig. 2.

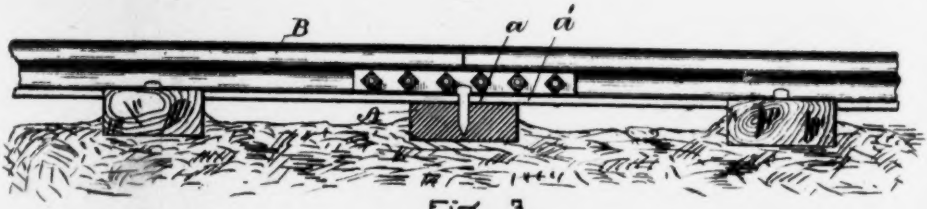


Fig. 3.

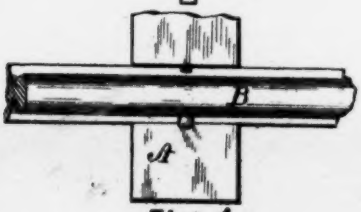


Fig. 4.

WITNESSES.

S. P. Small.

J. R. Dolan.

INVENTOR.

Edward H. Ashcroft.

by his Atty

Clark & Bynum.

(No Model.) 3 Sheets—Sheet 2.

1132

E. H. ASHCROFT.

CONSTRUCTION OF RAILROADS.

No. 388,240. Patented Aug. 21, 1888.

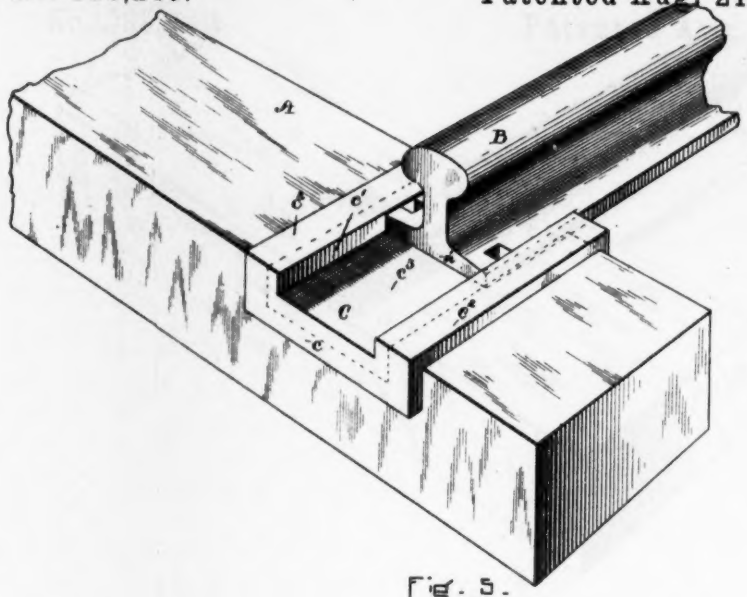


Fig. 5.

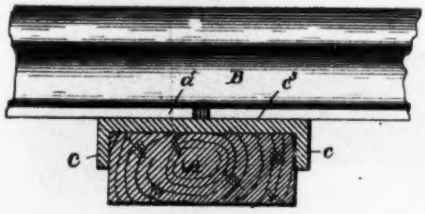


Fig. 6.

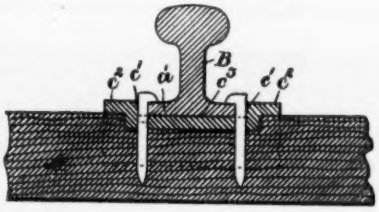


Fig. 7.

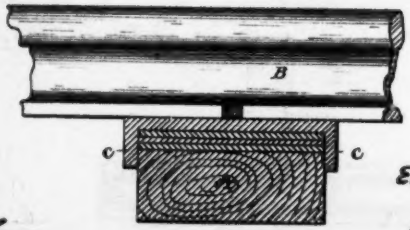


Fig. 8.

WITNESSES.
J. R. Dolan
E. P. Small

INVENTOR.
Edward H. Ashcroft
by his Attys
Clarke & Raymond

1133

(No Model.) 3 Sheets—Sheet 3.

E. H. ASHCROFT.

CONSTRUCTION OF RAILROADS.

No. 388,240. Patented Aug. 21, 1888.

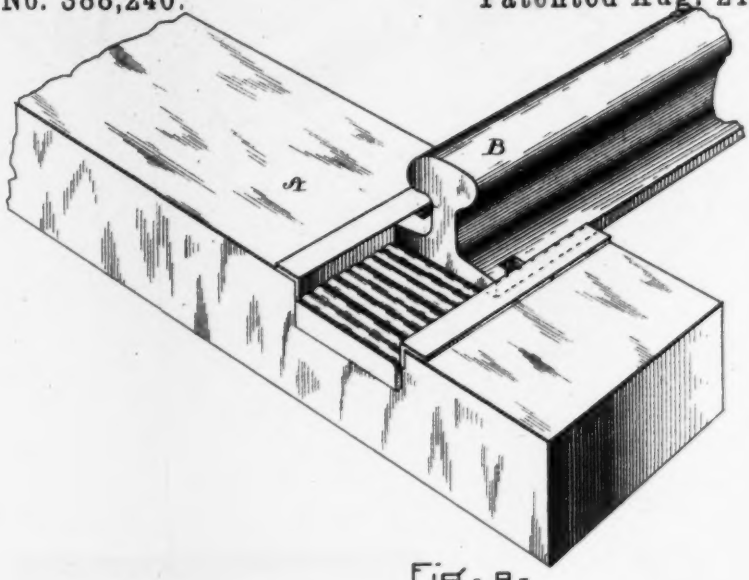


Fig. 9.

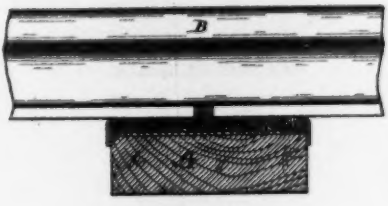


Fig. 10.

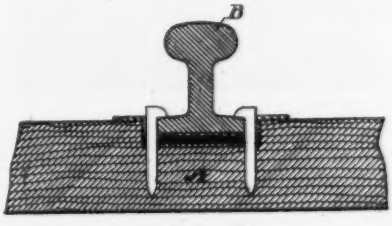


Fig. 11.

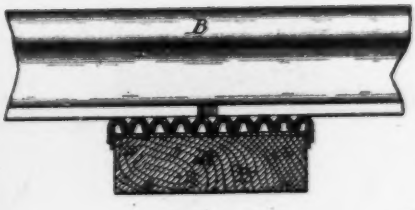


Fig. 12.

WITNESSES—
J. W. Dean.
G. P. Dewall

INVENTOR—
Edmund H. Ashcroft
by Wiley
Clarke & Raymond

UNITED STATES PATENT OFFICE.

EDWARD H. ASHCROFT, OF LYNN, MASSACHUSETTS.

CONSTRUCTION OF RAILROADS.

SPECIFICATION forming part of Letters Patent No. 388,240, dated August 21, 1888.

Application filed February 6, 1888. Serial No. 263,070. (No model.)

To all whom it may concern:

Be it known that I, EDWARD H. ASHCROFT, of Lynn, in the county of Essex and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Construction of Railroads, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates to the construction of a railroad whereby the rails are tied together by the cross-ties or sleepers, which also support them in a more effectual manner than is the case with the present construction.

Heretofore rails have been supported upon the upper surfaces of the sleepers or cross-ties, and are prevented from moving laterally thereon and spreading from each other by spikes driven into the sleepers or cross-ties, and in some instances by metal tie-bars, which, however, do not act to support the rails.

By my invention I cause the sleepers or cross-ties not only to act as a support for the rails, but also to t. the rails securely together in a manner to cause them to act in this capacity without the emp. ment of the ordinary spike, or, rather, to supplement the ordinary spike and enable the ordinary iron tie bar or rod to be in a measure dispensed with.

This result is accomplished by sinking in the upper surfaces of the sleepers or ties channels of a width and depth to receive the base of the rails, or a chair of peculiar construction upon which the bases of the rails rest.

In the drawings, Figure 1 is a view in perspective representing a section of a sleeper and the end of a rail to illustrate my invention. Fig. 2 is a vertical section taken through two parallel rails and showing the sleepers and a part of the road-bed, to further illustrate the construction and operation of my invention. Fig. 3 is a view, part in side elevation and part in section, of my improved road-bed. Fig. 4 is a detail view in plan. Figs. 5, 6, 7, and 8 refer to a slight modification, which is hereinafter described. Figs. 9, 10, 11, and 12 also relate to a slightly-different form of the said modification.

Referring to the drawings, A represents the sleepers or cross-ties, and they are of the ordinary kind of wood employed in railroad construction.

a represents the cross channels or recesses extending from the upper surfaces of the ties or sleepers and of the width of the base *a'* of the rails B and of a depth about that of the thickness of the base, and into these recesses or channels the rails are placed and fastened by spikes, or in any other desired way. This is the most simple form of my invention, and when so embodied I prefer to protect the sleepers or ties in and about the channels or recesses by coating the upper surface thereof with tar or other wood-preservative. The more elaborate form of invention is represented in Figs. 5 to 12, inclusive, where I have represented the channels in the cross-ties or sleepers made deeper to receive a metal chair, C, of a width to closely fit the channels or recesses and having end flanges, *c*, which extend downward on each side of the sleeper or tie, side walls, *c'*, and outwardly-extending flanges c^2, which extend upon the surface of the sleepers. The space c^3, between the side walls, *c'*, is of a width to receive the base *a'* of the rail, and in the main should be below the upper level of the sleeper or tie which supports it.

The downward-extending flanges *c* should be of a length sufficient to permit of the interposition of one or more flat plates between the under surface of the chair and the surface of the recess or channel, for the purpose of adjusting the chair properly in the sleeper as the sleeper becomes worn, and also for the purpose of enabling the two or three independent plates to be placed between the chair and the sleeper to absorb vibration.

It will be observed that this construction provides for a uniform and accurate gage—a most absolute preventive of the spreading of the rail, each tie or sleeper, or a large number of ties or sleepers, (because it is not necessary that every tie or sleeper should be thus secured,) acting not only as a support to which the rails are bolted, but also as a tie to prevent their lateral displacement in a much more secure and effective way than is possible by the use of spikes alone.

In Figs. 9 to 12, inclusive, I show the base or rail-support and the chair made corrugated instead of flat. This provides a somewhat

yielding or elastic connection between the rail and the sleeper. I prefer when this construction is employed that there be interposed between the corrugated base or support and the sleeper a flat metal plate, as represented in Fig. 12, and upon which the corrugated base of the chair rests. If desired, the chair may have one or more additional corrugated plates superimposed, for the purpose of providing additional strength. I prefer that the chair be formed from sheet metal by striking up.

It will be observed that a chair having the side flanges furnishes the rail with a bearing of greater area on the sleeper than the base of the rail alone provides, and this is of considerable importance, in that the integrity of the sleeper is longer maintained.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The combination of the sleepers or ties A, having the recesses or channels *a*, the metal chair C, having the flanges *c*, and the side walls, *c'*, which are placed in said recesses or channels, with the rail B, the bases of which are placed on said chair between the side walls thereof, as and for the purposes described.

2. The combination of the sleepers A, having the cross channels or recesses *a*, the metal chair C, having the side walls, *c'*, and the outwardly-extending flanges c^3, and the rails B, the bases *a'* of which rest upon said chairs between the walls *c'*, as and for the purposes described.

3. The combination of the ties or sleepers A, having the cross channels or recesses *a*, the chair C, having the downward-extending flanges *c*, the walls *c'*, and the outwardly-extending flanges c^3, with the rails B, the bases *a'* of which rest upon the side chairs and each other, and the said walls *c'*, substantially as described.

4. The combination of the sleepers A, having the cross recesses or channels *a*, the chairs C, having the downward-extending flanges *c*, the walls *c'*, and the outwardly-extending flanges c^3, one or more plates interposed between the chair and the sleeper, and the rails B, the bases of which rest upon the upper surface of the chair between the walls *c'*, substantially as described.

5. The combination of a chair having the corrugated base or rail-supporting surface, with one or more additional corrugated re-enforcing plates, substantially as described.

EDWARD H. ASHCROFT.

In presence of—
F. F. RAYMOND, 2d,
E. P. SMALL.

773 & 1774

EXHIBIT S13.

KATE S. HOLMES,
Notary Public.

1137

(No Model.)

T. A. DAVIES.

WEAR PLATE FOR RAILROAD RAIL TIES.

No. 421,678. Patented Feb. 18, 1890.

Fig: 1.

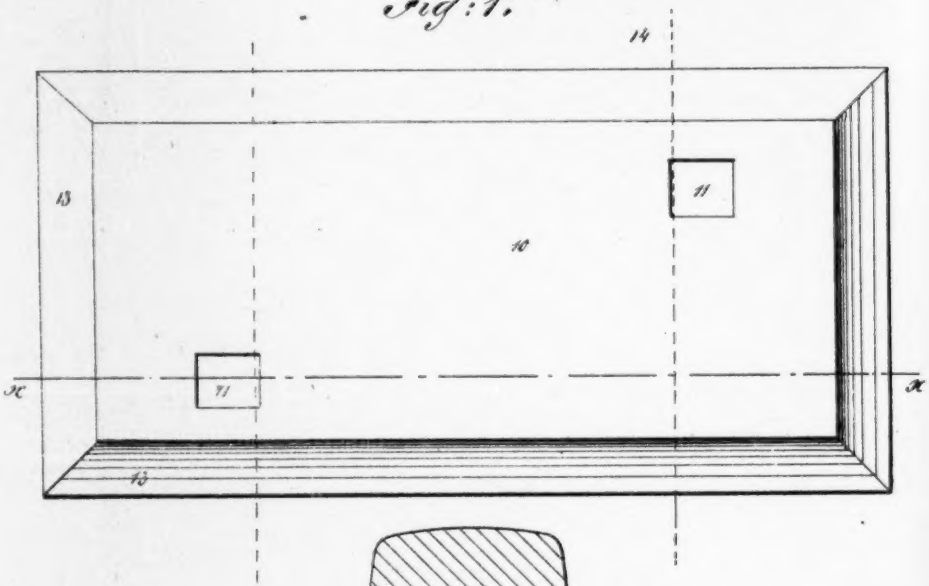
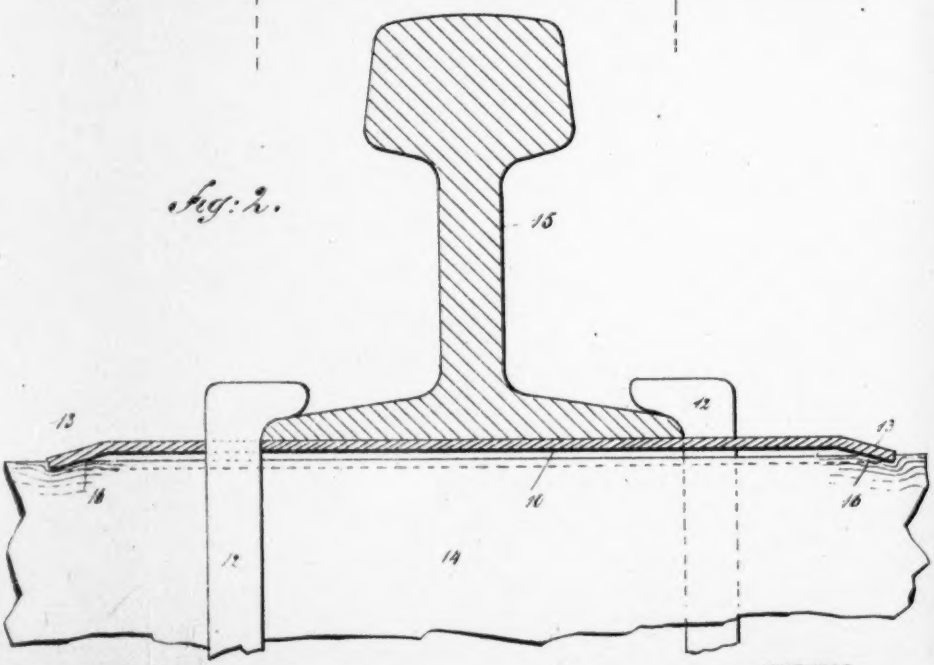


Fig: 2.



WITNESSES:

Chas Viola

E. M. Clarke

INVENTOR:

Thomas A. Davies

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

THOMAS A. DAVIES, OF NEW YORK, N. Y.

WEAR-PLATE FOR RAILROAD-RAIL TIES.

SPECIFICATION forming part of Letters Patent No. 421,678, dated February 18, 1890.

Application filed July 5, 1889. Serial No. 316,507. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. DAVIES, of the city, county, and State of New York, have invented a new and useful Improvement in Wear-Plates for Railway-Rail Ties, of which the following is a full, clear, and exact description.

My invention relates to an improvement in wear-plates for railway-rail ties, and has for its object to provide a plate which will effectually protect the surface of the tie covered thereby from the action of water, and especially to prevent the ingress of water between the plate and the tie.

A further object of the invention is to provide a wear-plate capable of being firmly attached to the tie, but which when so attached will not cut or otherwise injure the fibers of the wood, but simply compress the same.

The invention consists in the novel construction of the plate, as will be hereinafter fully set forth, and pointed out in the claim.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a plan view of the plate, and Fig. 2 is a section on line $x\,x$ of Fig. 1.

The tie-plate is preferably made from a single plate of metal stamped, forged, or otherwise manipulated in process of manufacture, comprising a flat body 10, usually rectangular in general contour, in which side openings 11 are produced to receive the spikes 12 and a downwardly and outwardly extending marginal flange 13, constituting a hood, the end surface of the flange being essentially straight or unsharpened. The angle of the flange with respect to the body is preferably very slight, as illustrated in Fig. 2, in which figure the angle represented is approximately correct. The plate is placed upon the tie 14, the flanges only contacting therewith, and the rail 15 is laid upon the plate. Spikes are then driven down through the openings 11, and when the spikes force the plate downward the flanges of the plate being unsharpened simply compress the fibers of the tie as they sink to a seat therein, as shown in Fig. 2, and in no manner cut or injure the fibers, whereby the tie is not only protected from wear, but is not lacerated in being so protected.

It is obvious that when the plate has been seated upon the tie it is impossible for rain or snow to gain access to the surface covered by the plate to rot the same, and even were it possible for a driving storm to force rain or snow between the outer end of the flange and the contiguous surface of the tie neither rain or snow could be forced farther, as either of them must ascend the inclined plane 16, created by the plate seating itself, which inclined plane is in contact with the inner surface of the flange.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

As an improved article of manufacture, a wear-plate for railway-rail ties, comprising a rectangular flattened body provided with an integral continuous marginal flange extending outward and downward at an angle to the body for contact with the tie, as and for the purpose specified,

THOS. A. DAVIES.

Witnesses:
F. ACKER, Jr.,
C. SEDGWICK.

1140 (No Model.)

W. GOLDIE.

RAILROAD RAIL CHAIR.

No. 426,530. Patented Apr. 29, 1890.

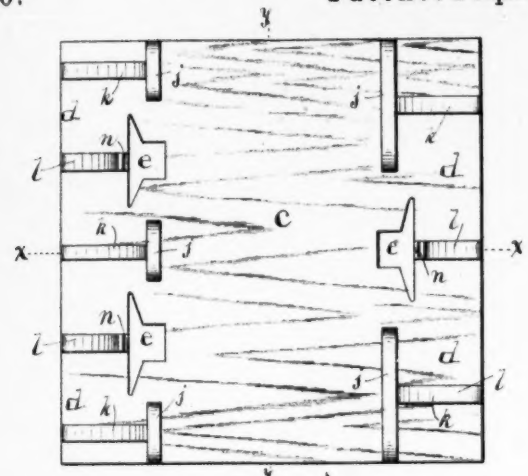


Fig. 1.

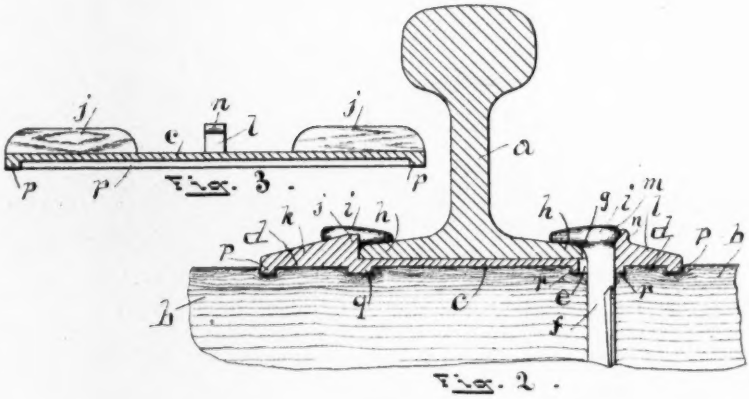


Fig. 3.

Fig. 2.

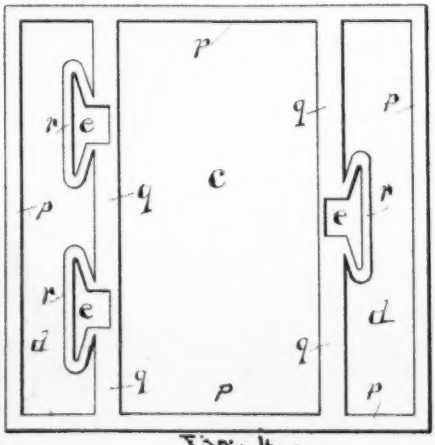


Fig. 4.

Attest:
W. H. Power.
Frank H. Durell.

Inventor
William Goldie
By Jas. E. Thom
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM GOLDIE, OF WEST BAY CITY, MICHIGAN.

RAILROAD-RAIL CHAIR.

SPECIFICATION forming part of Letters Patent No. 426,530, dated April 29, 1890.

Application filed February 16, 1888. Renewed October 16, 1889. Serial No. 327,166. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GOLDIE, a citizen of the United States, residing at West Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Railroad-Rail Chairs; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in chairs for railroad-rails which are placed between the rail and its supporting tie or sleeper.

With the common practice of building railroads the ties or sleepers, which are designed for holding and supporting the rails in position, are placed across the road-bed at suitable intervals, and the rails, usually of a T form, are laid across the surface of the ties and firmly held thereon by spikes, which are driven into the ties or sleepers in such a position that a projecting portion of the head of the spike will reach over and engage with the bottom flange or that portion of the rail which rests upon the surface of the tie. This form of rail-fastening is for a short time usually firm and solid, and perhaps safe; but after being in use for a very short time the rails thus secured by the compressing action and crowding strain of the passing trains, together with the effects of rain and damp weather upon the timber of the tie directly beneath the rails, become loose in their fastenings and unevenly supported by the ties, and are liable to spread apart and allow the cars to drop between or to become fractured and cause a derailment of the train, and the road hence requires continual care, attention, and labor to repair the track and retain the road in a reasonably safe and passable condition, and these difficulties obtain more especially when the supporting-ties of the road are of soft or porous wood, (cedar being largely used on account of its durability against decay,) which is more easily obtained than the harder and more dense varieties.

My invention consists, first, in a thin plate or web of metal provided with suitable holes or openings for the spikes, and having projecting downwardly from the outer edges of its under side, and also from the edges of the spike-openings, a bead or portion raised from the under surface of the web or plate, whereby the greater compression of the timber beneath the plate will obtain at the outer edges thereof and at the edges of the spike-openings; second, in a thin plate of metal placed between the rail and the tie and provided with spike-openings and upwardly-projecting brace-pieces, forming guide-stops, and having brace portions projecting upwardly from the surface of the chair on the outside of the spike-openings and adapted to bear against the rear or outer side of a driven spike for supporting that portion of the spike which remains above the surface of the tie, the transverse dimension of the said brace portions being less than the width of the spike-body, whereby the spike may be withdrawn from the tie by the ordinary spike-drawing implements.

The first object of my invention is to provide a device of metal to be placed between the rail and tie which will receive the chafing or grinding action of the rail, instead of the tie or supporting-sleeper.

A second object is to provide a metal chair for railway-rails which connects at the surface of the tie the outer with the inner spike in such a manner that a crowding strain upon the rail will be sustained by both of the said spikes.

A third object is to provide a means of preventing during rainy and wet weather the water from saturating the wood at the surface of the tie of the portion directly beneath the rail, whereby the firmness and rigidity of the timber are preserved in the portions of the tie receiving the greatest wear, and which receives the compressing action of the passing loaded trains.

A fourth object of the invention is to furnish a means of supporting and sustaining on the rear or outside that portion of the spike which remains above the surface of the tie in such a manner that the ordinary spike-drawing implements may be used without change for withdrawing the spike from the tie.

A fifth object is to provide the rail with a metal support which will cover an area of the surface of the supporting-tie greater than the width of the rail-flanges and receive the sliding and compressing action of the passing train, whereby the surface of the tie is preserved from abrasion and mutilation.

My improved rail-chair is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of the chair. Fig. 2 is a longitudinal vertical section of the same at *x x*, with a transverse section of the rail. Fig. 3 is a transverse section of Fig. 1 at *y y*. Fig. 4 is a plan of the under side of the improved chair.

a represents the railroad tie or sleeper, and *b* is the rail above and at right angles with the tie.

c is a thin web or plate of metal placed between the rail and tie, and is provided with the portions *d*, projecting laterally beyond the rail, and suitable openings *e* are formed in the portions *d* for the spikes *f*, which are driven into the tie *a* in the usual manner, the openings *e* being of any desired number and form required, and are suitably located to allow the neck or upper portion *g* of the spike-body to bear firmly against the lateral edges of the supporting-flange *h* of the rail, while the projecting portion of the spike-head *i* reaches over the upper surface of the rail-flange *h* and retains the rail, together with the chair, in position upon the tie.

Upon the upper surface of the laterally-extending portions *d* of the chair, and with their sides bearing against the lateral edges of the rail-flange *h*, are formed the raised portions *j*, and extending outwardly from the portions *j* are the brace-supports *k*. These stops or portions *j* are fitted to bear firmly against the lateral edges of the rail-flanges, which, together with the supporting brace portions *k*, operate to support and stiffen the plate and to distribute the weight of the rail partially to the lateral portions *d*, and to prevent the portions *d* from bending upwardly from the resistance of the tie beneath the plate and outside of the portions directly beneath the rail-flanges, and the stops *j* by having a wearing-surface of greater area prevent and relieve the neck *g* of the spike from the usual abrasion and cutting action of the rail-flanges. Upon the portions *d*, outside of the spike-opening *e*, are formed the upwardly projecting brace portions *l*, beginning at the outer edges of the openings and extending to the edges of the web or plate, and are of a sufficient height above the edges of the openings to reach nearly to the upper portion of the spike-head, and are so arranged that in driving the spike the rear portion *m* thereof will engage with and force back to a slight distance the top or upper portion *n* of the brace-supports, which adapts the portions *n* to allow a slight adjustment to conform to the inequalities of different spike-heads. The lateral dimension of the brace portions *l* is somewhat less than the width of the neck of the spike, which allows the ordinary spike-drawing implements to grasp the spike without change of construction.

One of the most essential features of this invention is the exclusion of water from the portion of the tie directly beneath the rail, and thereby prevent the saturation and softening and decaying of the said parts, which so quickly obtain with the common form of rail-fastenings, and this aim is accomplished by forming upon the edges of the under surface of the web *c* the portions *p*, projecting slightly below the surface of the web in such a manner as to form a continuous rim around the central portion of the web, so that when the chair is secured in position the greatest compression of the wood of the tie-surface thereof obtains at the edges of the plate. The dimension of this projecting portion in cross-section is such as to allow the rim or bead to be impressed slightly into the face of the tie without breaking or cutting into the grain of the timber, (which would not accomplish the result sought,) so that by closing together and packing the grain of the wood beneath the edge of the chair an obstruction is formed which prevents the water in rainy weather from passing beneath the chair and softening the timber at the portions of the tie which receive the greatest wear and which support the loads passing over the rails. Around the edges of the spike-opening *e*, and projecting downwardly from the under surface of the web *c*, are arranged the raised portions *r*. These portions *r* are of a form and dimension similar to the projecting rim *p* and perform the same function—*i. e.*, prevent the water which may pass within the openings *e* from passing beneath the plate or chair—and, also, by compressing the timber at the surface of the tie around the spike-opening after the spike is in position another and very important result is obtained—that is, the spike is provided at the surface of the tie with an additional support at the tie-surface, a point where the greatest resistance is required against a crowding strain, and, also, the grain of the wood being forced firmly against the spike by downward compression at the tie-surface effectually closes any space which may exist between the spike and the walls of the opening, as the compressed grain of the timber is expanded toward the spike-body by the action of the dampness or wet and prevents the entrance of water around the spike, and thereby avoids the soaking and softening of the walls of the opening which support the spike-body, and retains the said walls in a firm and solid condition.

q q are stiffening-ribs formed across the under surface of the plate *c*, and are so located that the center of their widths is directly beneath the line of the lateral edges of the rail-flanges, and they project below the surface of the web *c* to about the same distance as the portions *p* and extend to a short dis-

ance upon each side of the said line of the lateral edges of the rail-flanges and form stiffening braces or supports at the points of the chair which receive the greatest strain, and, being considerably wider than the rim at the outer edges of the web, form a greater resistance for the portions of the web at the edges of the rail where the compressing-power is applied than at the outer edges of the portions *d* of the web, whereby the entire plate is forced evenly in position without bending the web at the lateral sides of the rail-flanges, and the portions *q*, which extend entirely across the web and join with their rim *p*, also form a further stop or impediment to prevent the water which may have entered beneath the lateral portions *d* from saturating the tie directly beneath the rail.

The effect upon the tie of the rim *p*, which entirely surrounds the central portion of the web, and the portions *q*, which join the rim *p* at their ends, is of very great benefit, as the saturation of the tie directly beneath the rails in the common mode of fastening operates to soften and disintegrate the fiber of the timber, and the trains passing over the rails compress and mutilate the fiber and cause the rail-flanges to sink into the tie-surface, and as the rails always remaining in position upon the ties prevents evaporation the parts below the rails are held in a saturated and softened condition for an indefinite period, so that the wood in this portion of the tie, which receives all of the wear and which sustains the entire load of the train, is during a great portion of the time saturated and damp and deprived of the required firmness and solidity.

A further and very important feature of my improvement is the thinness and light weight of the chair, which, together with the peculiar construction described, adding to the strength and efficiency of the chair, accomplishes the same result in relation to supporting the rail as would be obtained by a heavier and more cumbersome device, and greatly reduces the cost of its manufacture, as well as of its application to use in roads already in operation.

The form of the openings *e*, as herein shown, is adapted to be used with a spike having wings projecting laterally from the edges of its rear side; but the form of the openings may be changed to conform to the peculiar form of any other spike, and is in no way essential to the operation of my invention.

Having described my improvement, what I claim as new, and desire to secure by Letters Patent, is—

1. A rail-chair consisting of a thin web of metal placed between the rail and tie, and having portions extending laterally beyond the edges of the rail-flanges and provided with spike-openings, and provided upon the edges of its under side with a downwardly-projecting continuous rim, substantially as and for the purpose set forth.

2. A rail-chair consisting of a thin web of metal placed between the rail and tie, and having its ends projecting laterally beyond the rail-flanges and provided with spike-openings, and provided upon the edges of its under surface with a downwardly-projecting continuous rim and with downwardly-projecting portions or rims upon the edges of the said spike-openings, substantially as and for the purpose set forth.

3. The combination, with the rail and tie, of a thin web of metal placed between the rail and tie, and having its ends projecting beyond the rail-flanges and provided with spike-openings, and having brace-supports, as *f*, projecting upwardly from the portion of the web outside of the said spike-openings, and the spikes passed through the said openings into the tie, and with their rear sides bearing against the said brace-supports, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM GOLDIE.

Witnesses:
JAS. E. THOMAS,
FRANK H. DURELL.

1145

(No Model.)

W. GOLDIE.

RAILROAD TIE PLATE.

No. 457,584. Patented Aug. 11, 1891.

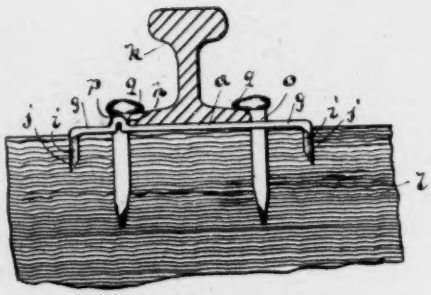


Fig. 4.

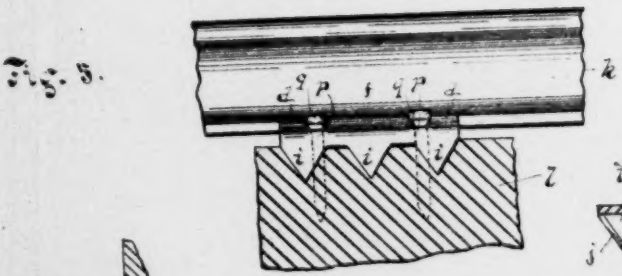


Fig. 5.

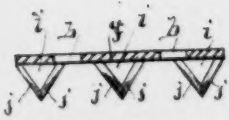


Fig. 2.

Fig. 6.

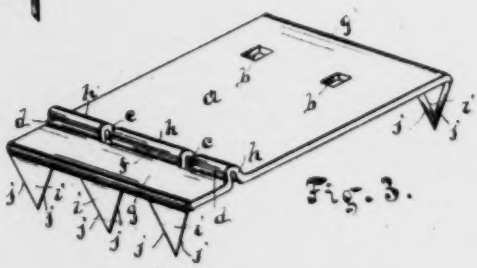
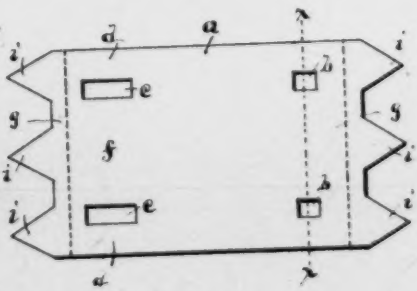


Fig. 3.

Fig. 1.



Attest:
Geo. P. Thomas.
J. M. Mason.

Inventor:
William Goldie
By Jas. E. Thomas
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM GOLDIE, OF WEST BAY CITY, MICHIGAN.

RAILROAD-TIE PLATE.

SPECIFICATION forming part of Letters Patent No. 457,584, dated August 11, 1891.

Application filed February 13, 1890. Serial No. 381,278. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GOLDIE, a citizen of the United States, residing at West Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Railroad-Tie Plates; and I do declare the following to be a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in railroad-tie plates, and especially pertaining to improvements on the tie-plate patented to me February 1, 1887, No. 356,760, and the rail-brace described and claimed in Letters Patent granted to me February 11, 1890, No. 421,268.

My invention consists in the form and construction of the blank for forming the tie-plate and in the form, construction, and arrangement of the tie-plate, and also in the combination of the same with a railway tie and rail, all of which will be fully described in the specification following, and will also be pointed out specifically in the claims thereof.

The chief object of my invention is to provide a reliable and durable fastening device for securing railroad-rails to the ties, which can be manufactured and applied for a small cost and expense.

Another object of the invention is to construct a light and durable tie-plate which will receive the wear and abrasion of the rails, and also be provided with great strength and power for resisting the lateral strain exerted on the rails by passing trains.

Another object is to provide a cheap and inexpensive device which will have a broad wearing-surface of metal to resist the abrasion and chafing action of the rail upon the tie and the neck portion of the spikes, and which will also bind or anchor the inner and outer spikes to each other, and also be provided with a special hold upon the wood of the tie, whereby all wear of the tie and spikes is avoided and the spikes are re-enforced in a manner to provide the greatest strength for resisting a lateral strain with a minimum of mutilation or cutting into the tie.

My invention is illustrated in the accompanying drawings, in which the same letters of reference are used for designating the same parts throughout the several views.

Figure 1 represents a face or plan view of the blank of which my improved tie-plate is preferably composed. Fig. 2 is a section of the same, taken at *x x*, and looking toward the right. Fig. 3 is a view in perspective of my improved tie-plate in its preferred form. Fig. 4 is a transverse vertical section of the rail and tie with my improved tie-plate in position. Fig. 5 is a side view of the same. Fig. 6 is a modified form of my improved tie-plate with the tie in transverse section.

As illustrated in Fig. 1, *a* represents the middle portion of a blank plate of metal which is to form the tie-plate, and this portion *a* is flat and of a width lengthwise of the plate equal to the width of the base of the rail, which is to rest transversely thereon, and through the end portions *g* on the lateral side of the portion *a* are arranged openings *b* and *c* of a suitable form to receive the spikes for holding the rail to the tie, and the openings *c* are elongated in the direction of the length of the plate and the portions *d* and *f* on the lateral sides of and between the openings *c* are raised upwardly and doubled upon themselves, so as to form stops or shoulders *h* each side of and between the openings *c*, as shown in Fig. 3. The blank plate, which also extends beyond the openings, is provided on its edges with a series of projecting tooth-like portions *i* of a triangular form, and these portions *i* are provided on their oblique edges with knife-edges or cutters *j*, formed by beveling the metal from the under side so that the cutters will lie coincident with the upper surface of the portions, and these portions *i* are bent downwardly at their base, so that they stand at a right angle and transversely with the plate and with the cutters, then coincident with the outer sides of the portions *i*, as shown in Fig. 3. The plate thus completed is placed between the rail *k* and the tie *l*, with the shoulders *h* against the outer edge of the base-flange *m* of the rail, and the portions *i* are then forced into the tie by driving until the under side of the plate lies firmly upon the tie, the points *i* easily entering the wood, while the diagonal cutters sever the grain of the timber with a clean shear on

a line with the outer surfaces of the portions *i*, so that the end fiber of the wood outside will be presented to the outer surfaces of the portions in a solid and undisturbed position, while the inner bevels of the portions provide the proper compression inwardly of the displaced wood fiber. Spikes *o* and *p* are then driven through the openings *b* and *c* into the tie, with the head portions *q* of the spikes reaching over upon the base-flanges of the rail, which retain the rail to the tie in the usual way. It is understood, of course, that the lateral strain on the rails is exerted on the inner sides thereof, thus crowding the rails outwardly, and that in the common mode of fastening the neck portions of the outer spikes only receive the chafing action of the rail-flange, so that by providing the shoulders *h* upon the plate to rest against the outer edge of the rail-flange a contact-surface is provided for the rail-flange of such an area that all chafing and cutting away of the spike-neck is avoided, and the plate being held against lateral movement by the portions *i*, in addition to the usual complement of spikes, and the spikes on opposite sides of the rail being anchored to each other and bound together by the plate beneath the rail altogether form an exceedingly strong and reliable fastening for a rail at a slight expense over the devices in common use.

Of course it will be understood that while I have described my improved plate as constructed of a plate of rolled metal with the shoulders formed by raising the portions between and on the lateral sides of the elongated spike-holes and doubling the same upon themselves I might prefer to roll the plate with a rib projecting upwardly to form the shoulders *h*, as shown in Fig. 6, and in that case the spike-openings *c* would then be punched through the rib and plate without the aforesaid elongation, and the operation of the device would be the same. Therefore

The following is what I claim as my invention and desire to secure by Letters Patent:

1. A blank for a tie-plate cut from a sheet of rolled metal and consisting of the central portion *a*, provided on one side with the spike-openings *b* and on the opposite side with the spike-openings *c*, elongated lengthwise of the plate and having a series of triangular tooth-like projections extending from its end edges, substantially as and for the purpose set forth.

2. A blank for a tie-plate, consisting of a plate of rolled metal having a flat central portion *a* and the end portions *g* and provided with an upwardly-raised rib or shoulder *h* across the plate at one edge of the said portion *a* and having the spike-openings *c* through the said rib and plate and the spike-openings *b* through the portion *g* at the opposite edge of the portion *a* and having at the ends of the plate the triangular tooth-like projections *i*, for the purpose set forth, substantially as described.

3. As a new article of manufacture, a tie-plate of rolled metal and consisting of a central portion *a* and the adjoining end portions *g*, provided with the spike-openings *b* and *c*, and with the raised shoulder *h* on the lateral sides of and between the said openings *c* and having on the edges of the outer ends of the plate the downwardly-projecting portions *i*, provided on their lateral edges and coincident with their outer faces with the diagonal cutters *j*, for the purpose set forth, substantially as described.

4. The combination, with the rail and tie, of a tie-plate having the central portion *a* between the tie and rail and provided with the spike-openings *b* and *c* and with a raised shoulder *h* on the portions between and on the lateral sides of the openings *c* and against the edge of the rail-flange and having the downwardly-turned portions *i*, provided on their lateral edges with diagonal cutters and forced into the tie, and the spikes passed through the said openings and into the tie and with their head portions reaching over the rail-flanges, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM GOLDIE.

Witnesses:
JAS. E. THOMAS,
J. M. MAXON.

93 & 1794 EXHIBIT S16.

KATE S. HOLMES,
Notary Public.

1149

(No Model.)

W. GOLDIE.

RAILROAD RAIL BRACE.

No. 457,585. Patented Aug. 11, 1891.

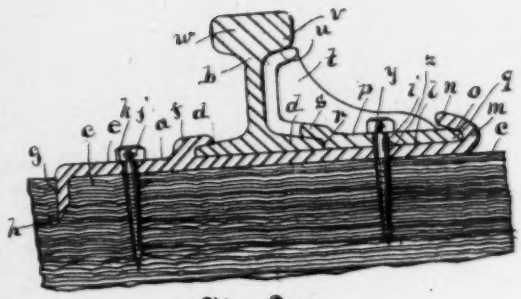


Fig. 2.

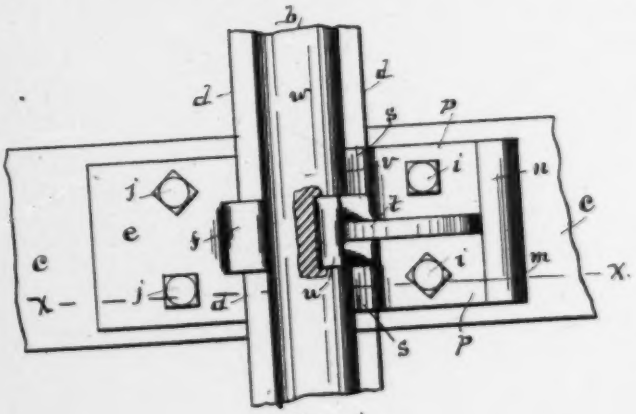


Fig. 1.

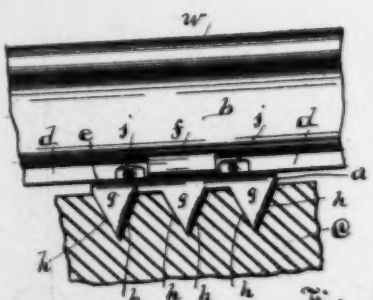


Fig. 4.

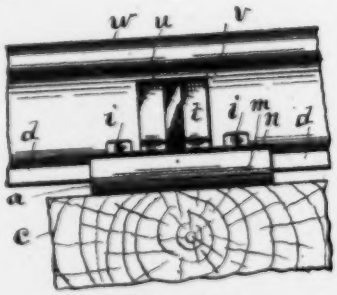


Fig. 3.

Witnesses:
L. P. Thomas.
J. M. Mason.

Inventor:
William Goldie
By Jas. L. Thomas
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM GOLDIE, OF WEST BAY CITY, MICHIGAN.

RAILROAD-RAIL BRACE.

SPECIFICATION forming part of Letters Patent No. 457,585, dated August 11, 1891.

Application filed February 13, 1891. Serial No. 381,279. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GOLDIE, a citizen of the United States, residing at West Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Railroad-Rail Braces; and I do declare the following to be a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in railroad-rail braces of the class used in combination with tie-plates for carrying the rails; and the object of the invention is to provide a means for securing railroad-rails to the ties that will prevent the abrasion and cutting away of the ties by the rails, and also provide a strong and substantial brace for the upper portion or tread of the rails for supporting the rails against a crowding or lateral strain from passing trains, whereby the strength of the road is materially increased and faster and heavier trains can be run with safety.

Another object is to so arrange a tie-plate and rail-brace that the rail will be thoroughly and reliably held in position without contact with the spikes, and to provide an extensive and broad contact-surface on the securing devices to receive the wear and grinding action of the rails, whereby the abrasion and mutilation of the rail-flanges and the spikes is avoided, the liability of accidents from spreading or breaking of the rails and spikes is reduced, and the expense of repairing and keeping the road in proper condition is diminished; and my invention consists in a tie-plate between the rail and tie and provided on one end portion extending beyond the tie with downwardly-turned portions driven into the tie and with a lip or flange reaching over the edge of the rail-flange and provided on the opposite end with an upturned portion forming a shoulder, and a brace-piece having its outer edge resting against the said shoulder and with its opposite end provided with a shoulder on its under side for resting against the rail-flange and with a lip reaching upon the flange and with a brace extending upwardly and resting against the under side of the tread of the rail, and bolts or spikes passed through the brace portion and tie-plate and driven into the tie, all of which will be hereinafter more particularly described, and will also be especially designated in the claims of this specification.

In the accompanying drawings my improvement is shown in several views, throughout which the same letters of reference are used to designate the same elements or parts.

Figure 1 represents a plan view of my improvement as attached to a railroad-rail and tie. Fig. 2 is a vertical transverse section of the same, taken at *x x*. Fig. 3 is a view in elevation of the outer side of a rail secured in position upon the tie by my improved fastening. Fig. 4 is a view of the inner side of the same with transverse section of the tie.

a represents a tie-plate of rolled metal placed between the rail *b* and the tie *c*. This plate extends to a considerable distance on each side of the base-flange *d* of the rail, and the portion *e* on the inner side of the rail is provided with an upwardly-projecting flange *f*, which rests in contact with the edge of the base-flange *d*, and also reaches over upon the flange, and the inner end of the portion *e* is provided with downwardly-turned portions *g*, which in turn have their diagonal edges *h*, made sharp so as to sever transversely the fiber of the tie into which they are driven in a neat and clean manner. This portion *e* is also firmly secured upon the tie by one or more screw-bolts *j'*, as required, passed through suitable openings *k* in the plate and driven into the tie. The opposite end portion *l* of the tie-plate is provided with an upturned portion *m*, and this portion *m* is in turn provided with an inwardly-turned flange or rib *n*, leaving a groove-like space or channel *o* between the portion *n* and the tie-plate, and the portion *m* is arranged so as to lie slightly at an angle with the plate, so that the space between the rail and the part *n* will be greater at one side edge of the plate than at the other.

p is a base of a brace portion, and lies with its under face upon the portion *l*, and is arranged with its outer edge *q* within the channel *o*, and is provided on its inner edge with a shoulder *r* in contact with the lateral edge of the base-flange *d*, and also with a lip *s*, reaching over the upper side of the flange.

Projecting upwardly from the middle portion of the part *p* is arranged a brace *t*, which has its upper end provided with a contact-surface *n*, adapted to rest beneath the outer projection *v* of the tread *w* of the rail, and the outer edge *q* of the base is arranged to lie slightly inclined to the shoulder *r* to correspond to the incline of the groove *o*, and the tie-plate being in position, with the inner side of the base-flange *d* resting against and beneath the flange *f*, the brace portion is placed against the outside of the rail with the outer edge *q* resting in the groove *o*, and then is moved laterally to bring the inclines of the edges *q* to a solid bearing against the incline of the groove, which brings the face *n* of the brace and the shoulder *r* to a solid and firm bearing against the tread *w* and flange *d* of the rail, and this brings the openings *y* in the base *p* and the openings *z* in the tie-plate to coincide, and then bolts or spikes *i* are passed through the openings and driven into the tie to secure the parts in position. The brace portion *t* being upon the outer side of and supporting the rail from its upper or tread portion and resting upon the tie-plate, which is provided with an extended bearing-surface on the tie, serves to distribute the weight of the rail and its load over a greater area of the surface, so that the usual jarring and compression upon the tie does not operate to mutilate the tie beneath the rails, and the effect of the usual chafing and grinding by the longitudinal movement of the rails in contact with the ties and spikes, obtains on the greater area of the metal tie-plate and the flanges, so that the wear of the parts is greatly reduced and the efficiency of the road is materially enhanced.

It will be noticed that it is not altogether necessary that the part *n* shall extend over the outer edge *q* of the brace portion, as this part *n* being omitted the bolts or spikes *i* retain the parts together, and the bracing effect of the part *m* is substantially the same, and by forming the tie-plate of a thin rolled sheet and providing the portions *g* for entering the tie a firm and solid support for the rails upon the ties is provided without great expense, while by the addition of the brace portion outside of the rail and against the upturned portion *m* a means of retaining the track to the correct and required gage is provided, whereby the cost of realigning the track and changing the gage thereof is avoided, and the chances for accidents from spreading of the rails is greatly lessened, and the portion *g* which enters the tie may be omitted and good results will be produced, as the spikes being tied together by the plate beneath the rail produce a powerful resistance against a crowding or lateral strain, and, if desired, the openings *k* may be so located as to permit the spikes to be driven in contact with the inner edge of the rail and with the heads reaching over the rail-flange, and thus permit the flange *f* to be omitted, so that I do not confine my invention altogether to the form of construction shown for the inner end portion of the tie-plate.

Of course it is not altogether necessary that this form of fastening should be applied to all of the ties, as when the track is straight every second or third tie supplied with this improvement is sufficient to retain the rails in alignment, while around curves, switches, and bridges, where extra strength of fastening for the rails is necessary to insure safety, the improved fastening is placed upon all of the ties.

It will also be noticed that the area of the tie-plate is such that a large portion of the tie in proximity to the rail is protected against wet and dampness, so that the portion of the tie which supports and carries the load will always remain dry and retain its original strength and rigidity.

Having now described the construction and operation of my improvement, what I claim as my invention is—

1. The combination of the tie and the rail, with a tie-plate between the rail and tie and provided with an upwardly projecting flange having an approximately horizontal extension for contact with the inner lateral edge and upper side of the base-flange of the rail and provided on its outer end with an upwardly and inwardly projecting flange, and a brace-piece having its inner end fitted to overlie the base-flange and hug the under side of the tread and the web of the rail and having a base portion resting upon the tie-plate with its outer edge resting against the said upwardly-projecting flange and with its inner edge against the lateral edge of the base-flange of the rail, and bolts or spikes passed through the said base portion and tie-plate and into the tie, substantially as and for the purpose set forth.

2. A railroad-rail support consisting of a plate provided on its inner end portion with an upwardly-projecting flange having an approximately horizontal extension for engaging with the inner edge and upper side of the inner base-flange of the rail and provided on its outer or opposite end with an upwardly-projecting flange, and a brace portion having a base resting on the said tie-plate with its outer edge against the said upwardly-projecting flange and with its inner edge against the outer edge of the base-flange of the rail and having an upwardly-projecting brace with its inner edge fitted to hug the under side of the tread and to overlie the upper side of the base-flange of the rail and provided with spike-openings through the said base portion and the tie-plate, substantially as set forth.

3. The combination of the tie and the rail, with a tie-plate between the rail and tie and provided with a downwardly-turned portion on its inner end entering the tie and with an upwardly-projecting flange engaging with and reaching over the inner edge of the rail-flange and provided on its outer end

with an upwardly and inwardly turned shoulder, and a brace with its upper end in contact with the outer side of the tread of the rail and having its lower portion resting on the said tie-plate and in contact with the said shoulder and the outer edge and upper side of the outer rail-flange, substantially as and for the purpose set forth.

4. The railway-rail and tie, in combination with the tie-plate between the rail and tie and provided on its inner end with a downwardly-turned portion entering the tie and with an upwardly-extending flange for engaging with and reaching over the inner edge of the rail-flange and having its outer end turned upwardly and inwardly to form a shoulder and groove, and a brace portion provided on its upper end with a face fitted to engage with the outer under side of the tread of the rail and having a base portion resting upon the said outer portion of the tie-plate and with its outer edge engaging with the said upturned shoulder and with the inner edge of the base fitted to engage with the outer edge and the upper side of the base-flange of the rail, and spikes or bolts passed through the said base portion and tie-plate and into the tie, substantially as set forth.

5. A railroad tie-plate and brace consisting of a tie-plate having a central portion for supporting the rail and having an extended inner portion provided with openings for a spike or bolt and with downwardly-turned portions on its outer end for entering the tie and with an upwardly-projecting flange for engaging with the inner edge of the rail and having its opposite outer end portion provided with openings for the spikes and with its outer end upturned to form a shoulder or groove, and a brace portion with its upper end provided with a face for contact with the tread of the rail and having the base portion resting on the said tie-plate with its inner edge fitted to bear against and reach over the lateral edge of the rail-flange and with its outer edge bearing against the said upturned end of the tie-plate and provided with spike-openings coincident with the said spike-openings in the tie-plate, substantially as set forth.

6. A combined rail-brace and tie-plate consisting of two sections, the tie-plate section having an upwardly-projecting flange provided with an approximately horizontal extension for overlying and holding down the inner edge of the rail-flange and having on its outer end an upwardly and inwardly projecting flange, and a brace-section having a base portion resting upon the tie-plate and with its outer edge in contact with the said upwardly-projecting flange and with its inner edge against the lateral edge of the rail-flange and provided with an upward extension having its inner edge fitted to hug the under side of the tread and the lateral side of the web and to overlie the base-flange of the rail for effecting an efficient holding-down action, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM GOLDIE.

Witnesses:
JAS. E. THOMAS,
J. M. MAXON.

1154

(No Model.)

W. KENNISH.

PROTECTOR FOR THE ENDS OF BEAMS.

No. 462,357. Patented Nov. 3, 1891.

Fig. 1.

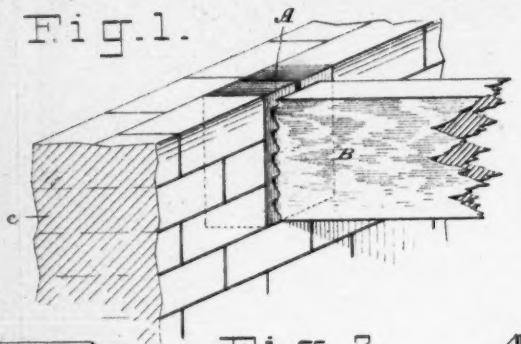
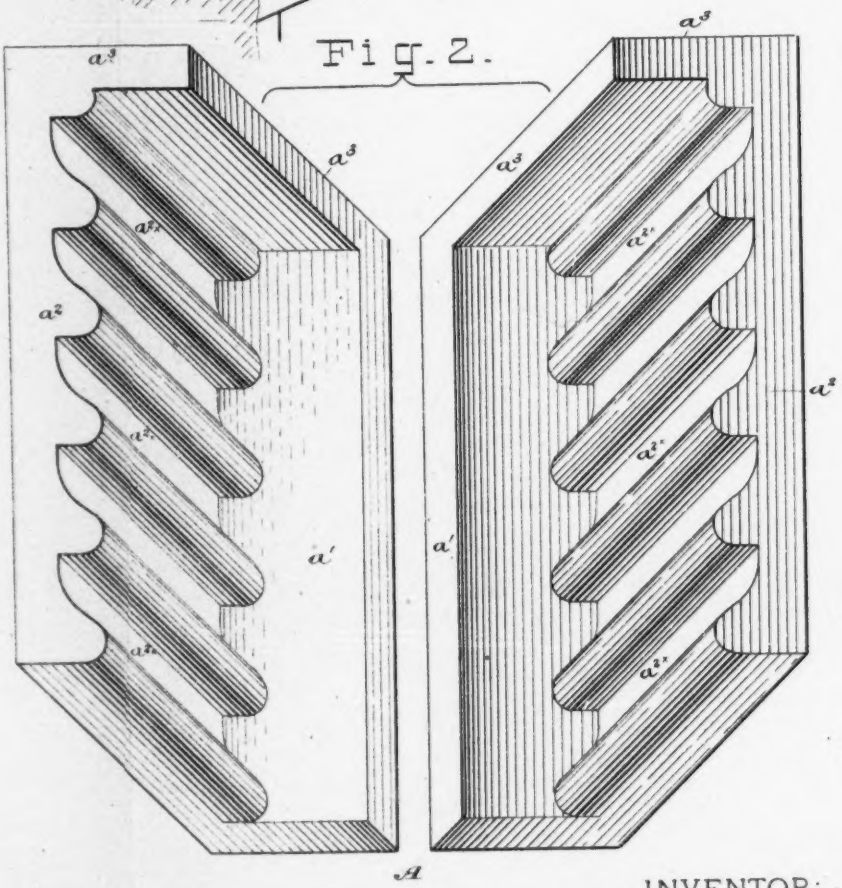


Fig. 2.



INVENTOR:

William Kennish

By Henry Bonnett

Attorney.

WITNESSES:

C. B. Bolton

J. B. Caplinger

UNITED STATES PATENT OFFICE.

WILLIAM KENNISH, OF BROOKLYN, NEW YORK.

PROTECTOR FOR THE ENDS OF BEAMS.

SPECIFICATION forming part of Letters Patent No. 462,357, dated November 3, 1891.

Application filed June 2, 1890. Renewed September 15, 1891. Serial No. 405,741. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM KENNISH, a citizen of the United States, residing at Brooklyn, Kings county, New York, have invented certain Improvements in Protectors for the Ends of Beams, &c., of which the following is a specification.

My invention relates to that class of devices employed in buildings and other like structures for incasing the ends of beams set in the walls or masonry thereof in order to protect said ends from deterioration and decay from the moisture of the masonry, as well as from the attacks of insects and the like.

The object of my invention is, in part, to provide a protector of this general character wherein sufficient space shall be provided about the end of the beam to afford free access of the air, in part to provide a protector which shall be applicable to beams of varying cross-section within limits, and in part to provide a protector which shall hold the beam firmly in place when once set about the end thereof.

In the accompanying drawings, which serve to illustrate my invention, Figure 1 is a perspective view, on a reduced scale, of a beam provided with my protector, set in the wall of a building. Fig. 2 is a perspective view, on a larger scale, illustrating the two like parts or sections of my protector.

In the drawings, A represents my improved protector as a whole, B the beam, and C the masonry of the wall.

a a represent the two sections or halves of my improved protector, which are or may be substantially like and equal. Hence a description of one section will suffice for both. The section *a* consists of a back or base a', from which project, on two adjacent sides or edges, the side flange a^2 and the top or cover flange a^3. The side flange a^2 is provided on its inner face with raised transverse ledges or serrations $a^{2\times}$, which extend over its entire inner surface.

In applying my improved protector to the ends of beams in buildings the masonry or brick-work is laid up to the level of the tier at which the beam is to be set and the beam is then placed. When properly placed and set on the last tier of brick, the two sections of my protector are applied over the end of the beam and the brick is laid on either side thereof, as usual, care being taken to press the sections well together, in order to hold the beam firmly.

A beam provided with my improved protector will, as may be readily seen, greatly outlast one set in the usual manner, especially where there is much moisture in the wall; and in order to more fully protect the beam against such moisture it may be desirable in some cases to spread the last tier of brick below the beam and to fill up the space between the sections of the protector with cement.

As will be readily observed, my protector, being preferably constructed of concrete, burned clay, or other such material, may be applied to beams of varying dimensions. Where the beam is too thick, the space between the sections is filled with cement and where the beam is too narrow the flanges of the sections are broken away to fit.

The ledges or serrations $a^{2\times}$ serve two useful purposes. They hold the beam when set firmly in position away from the side flanges a^2, thus allowing free access of air about the sides of the beam end for purposes of ventilation. These ledges may of course be provided on the cover-flange a^3 and base a', as well as on the side flange; but this is not usually necessary.

My protector has certain important characteristics, namely: Its sections are plain or unprovided with any curved lips on their faces for securing them together when applied, and they are disconnected, so that they can be set at any distance apart that may be required to adapt them to the thickness of the beam to be protected. The planes of the faces of the sections adjacent to the dividing-line between them are perpendicular to the base of the protector, or substantially so, and each section is provided with a cover-flange to take over the top of the beam.

In manufacturing my improved protector I prefer to so proportion it as to replace some certain number of brick, both as regards its width, thickness, and height; but this is not essential, as the spaces remaining after the protector is set in place may, as stated before, be filled with cement or ordinary mortar; nor is it essential to my invention that my

protector shall be formed from concrete or burned clay. It may be of metal in some cases, although the moisture of the wall would necessarily corrode iron and therefore deteriorate the end of the beam. For general use, where the beams are of varying cross-sections, I prefer to form it of concrete.

Having thus described my invention, I claim—

1. As an improved article of manufacture, a protector for the end of a beam or joist, consisting of two plain sections or halves, each having a cover-flange a^3 to take over the top of the beam when the protector is in place.

2. As an improved article of manufacture, a sectional protector for the end of a beam or joist, having back, side, and top flanges only, whereby the protector may be applied after the beam has been placed and set.

3. As an improved article of manufacture, a protector for the end of a beam or joist, consisting of two sections or halves, each having back, side, and top flanges, the planes of the faces adjacent to the dividing-line between them being substantially perpendicular to the base of the protector.

4. As an improved article of manufacture, a sectional protector for the end of a beam or joist, consisting of two like sections having back, side, and top flanges only, and provided with integral ribs $a^{2\times}$ on its side flanges, said ribs having convex or rounded surfaces, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM KENNISH.

Witnesses:
HENRY CONNETT,
J. D. CAPLINGER.

1807 & 1808

EXHIBIT S18.

KATE S. HOLMES,
Notary Public.

(No Model.) 3 Sheets—Sheet 1.

P. C. DOCKSTADER.

LOCK RAIL JOINT.

No. 462,399. Patented Nov. 3, 1891.

Fig 1.

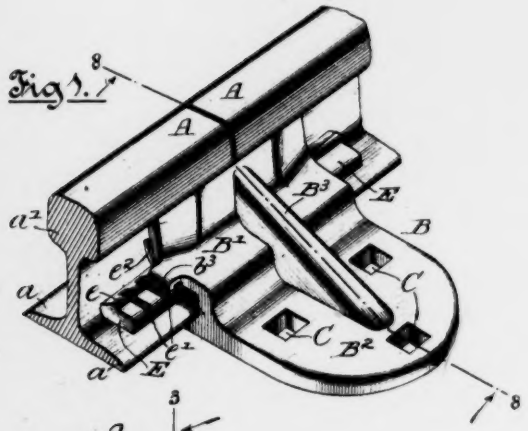


Fig 2.

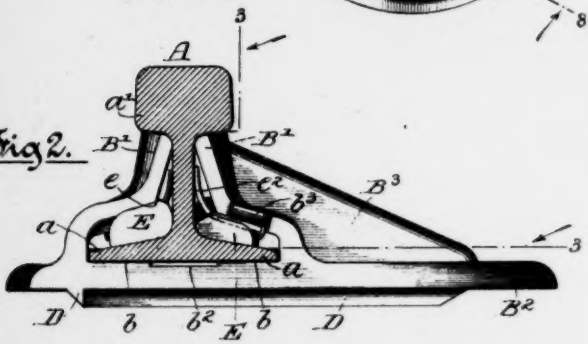


Fig 3.

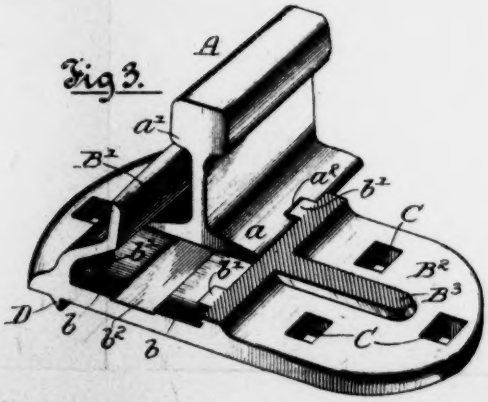


Fig 4.

Witnesses
Wm. F. Fleming
Louis W. Whitehead.

Inventor
Preston C. Dockstader
by Dayton, Poole & Brown
Attorneys.

1159

(No Model.) 3 Sheets—Sheet 2.

P. C. DOCKSTADER.

LOCK RAIL JOINT.

No. 462,399. Patented Nov. 3, 1891.

Fig 5.

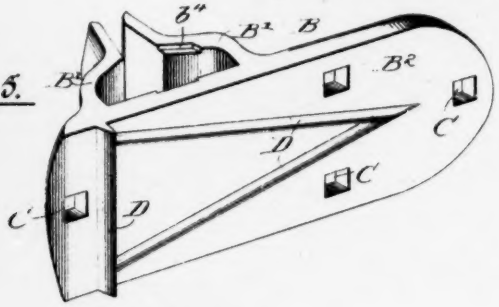


Fig 6.

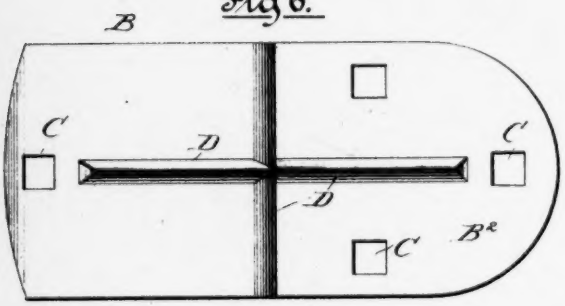


Fig 7.

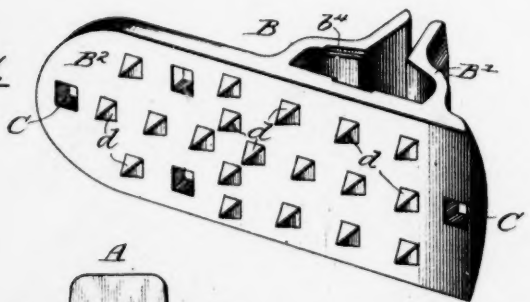
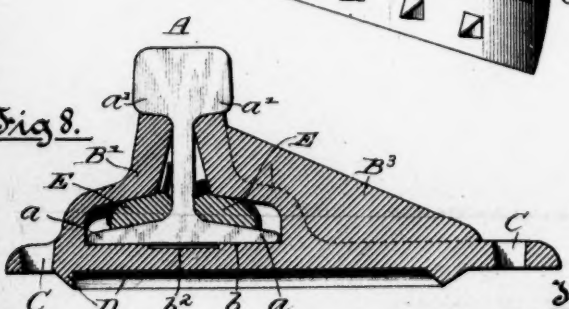


Fig 8.



Witnesses
Wm. F. Fleming
Louis M. Whitehead

Inventor
Preston C. Dockstader

by Mayo Lee, Poole & Brown.
Attorneys.

1160

(No Model.)

3 Sheets—Sheet 3.

P. C. DOCKSTADER.

LOCK RAIL JOINT.

No. 462,399.

Patented Nov. 3, 1891.

Fig 9.

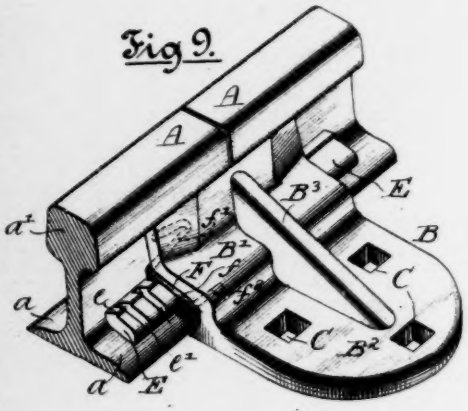
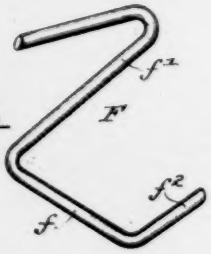


Fig 10.



Witnesses
Wm. F. Fleming
Louis W. Whitehead

Inventor
Preston C. Dockstader
by Dayton, Poole & Brown
Attorneys

UNITED STATES PATENT OFFICE.

PRESTON C. DOCKSTADER, OF COLORADO SPRINGS, COLORADO.

LOCK-RAIL JOINT.

SPECIFICATION forming part of Letters Patent No. 462,399, dated November 3, 1891.

Application filed October 25, 1890. Serial No. 369,326. (No model.)

To all whom it may concern:

Be it known that I, PRESTON C. DOCKSTADER, of Colorado Springs, in the county of El Paso and State of Colorado, have invented certain new and useful Improvements in Lock-Rail Joints; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in the construction of devices for locking the ends of railroad-rails together, wherein a "chair" is used within or upon which the adjacent ends of two rails are placed and to which said rails are secured.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a perspective view of a chair embodying my invention with the adjacent ends of two rails locked in position therein. Fig. 2 is a side elevation of the same. Fig. 3 is a perspective view, partly in section, the sectional portion of said view being taken on line 3 3 of Fig. 2. Fig. 4 is a separate perspective view of one of the wedges employed to retain the ends of the rails in proper position within the chair. Fig. 5 is a perspective view of the chair, illustrating the manner in which the under side of said chair is formed. Fig. 6 is a bottom plan view illustrating a modified form of the same. Fig. 7 is a perspective view illustrating another modification. Fig. 8 is a central vertical section taken on line 8 8 of Fig. 1. Fig. 9 is a perspective view of a chair, showing a different method of securing the wedges in place. Fig. 10 is a separate view of the key.

In said drawings, A A indicate the adjacent ends of the rails, and B a chair of wrought or cast iron, steel, or other suitable material. The chair B is formed with a flat surface *b*, upon which the ends of the rails rest. The chair B is also formed with two upwardly-projecting flanges B′ B′, suitably shaped, to embrace the lateral flanges *a a* upon the base of the rails and engage at their upper edges against the under side of the heads *a′ a′* of the rails adjacent to the webs of the latter. These flanges B′ B′ are curved or deflected inwardly, so as to approach the webs of the rails above the flanges *a a* at the bottom of the rails, and are then directed upwardly and inwardly, so as to engage the webs of the rails adjacent to the head of the latter.

The chair is designed to be placed upon and secured to the railroad-tie, and for this purpose holes C C are formed in said chair at convenient locations, through which spikes are driven into the tie to secure said chair in place thereon.

Upon the flat face *b* of the chair and at the sides thereof upon which rest the flanges *a a* of the rails are formed upwardly-projecting studs or lugs *b′ b′*, adapted to engage corresponding notches a^2 a^2 in said flanges *a a* to prevent the rails from shifting longitudinally within said chair. The space between the inclined portions of the flanges B′ B′ of the chair B and the horizontal surface *b* is made sufficiently great to permit the flanges *a a* at the base of the rails to be inserted under said flanges and above said studs *b′ b′* and moved longitudinally within said space until the notches a^2 a^2 coincide with said studs when the rail is dropped down, so that the studs will engage said notches and retain the ends of the rails in place within the chair. The under or inside surfaces of the flanges B′ B′ are preferably somewhat inclined from end to end, so that the space between each of said flanges and the horizontal surface *b* is somewhat greater at one end than at the other, and when the rails are properly adjusted tapered wedges E E are driven into said spaces above the flanges a^2 a^2 and between said flanges a^2 a^2 of the rails and the flanges B′ B′ of the chair, so as to prevent displacement of the rails. The wedges E E are preferably of such shape in cross-section as to conform to the shape of the rail at the base of the web, so as to firmly brace the rails against lateral strain. The form of said wedges is clearly shown in Figs. 1, 2, 4, and 8, and, as shown in said figures, a longitudinal rib *e* may be provided along the upper edge of each of said wedges, said ribs being adapted to engage the angles formed by the bend in the flanges B′ B′ and operating to more firmly crowd said wedges against the webs of the rails when they are driven into position within the chair.

The under surfaces of the flanges B′ B′ are inclined in such manner that the larger or deeper portion of the space beneath one of said flanges will be at one end of the chair and the large or deep part of the space beneath the other flange will be at the other end of the chair, so that the wedges E E may be driven into said spaces from opposite ends of said chair. By this construction a very firm and even pressure is brought upon the rails, and any strain which would tend to loosen one of the wedges would obviously tend to tighten the other, so that the liability of the rails "creeping," so common in joints of this character, is very greatly lessened. The chair is also formed with one of its sides, preferably the side designed to come upon the outer side of the rails, or that next the end of the tie when in use, extended or prolonged in a direction at right angles to the rails, as shown in the drawings at B^2, so as to provide additional strength at the outside of the chair to prevent the liability of the rails spreading and to afford a more stable support for the same. In order to further strengthen said outer portion of the chair, I provide a rib or brace B^3, extending from near the top of the outer flange B′ downwardly and outwardly along the extended portion B^2 of the chair.

As a separate and further improvement, in order to more securely hold the chair in position upon the tie, I provide one or more ribs or flanges D upon the under side of the chair, as shown more particularly in Figs. 5 and 6. These ribs are formed with sharp edges, so that when the chair is placed upon the tie and spikes driven through the holes C C to secure the chair in place as the spikes are driven home the ribs D D will be forced into the upper surface of the tie. In this manner the ribs afford an additional support to prevent the chair from shifting from its proper position upon the tie and relieve in a great measure the strain upon the spikes. The ribs D D may be arranged in any preferred manner upon the under side of the chair, either as shown in Fig. 5 or in Fig. 6 or otherwise, as desired.

Instead of the ribs D D, a number of pointed studs, as *d d*, Fig. 7, may be formed upon the under side of the chair, which will of course operate to retain the chair in position upon the tie in the same manner as the ribs D D.

By reference to the drawings it will be observed that the bolt-holes are all inclosed instead of being arranged in the form of notches cut in the margins of the chair, as in the forms of chairs heretofore commonly in use. By this construction the chair is much more firmly retained in position on the tie, and there is no liability of its becoming loosened, as sometimes occurs in the use of open notches by reason of one or more of the spikes being bent outwardly until free from said notches.

The horizontal surface of the chair between the flanges B′ B′ is preferably hollowed out or grooved at its central part, as shown at b^2 in Figs. 2, 3, 5, 7, and 8 of the drawings, so that the side flanges *a a* of the rails will rest evenly upon the surfaces *b b* at each side of the chair. By this construction the strain is uniformly distributed throughout the chair and is not concentrated at a point directly beneath the web of the rail, as would be the case if the groove b^2 were not present.

As a separate and further improvement, I provide each of the wedges E E with one or more grooves or slots *e′ e′* at its smaller end, said slots or grooves extending crosswise of the wedge, as shown more particularly in Fig. 4 of the drawings. The wedges are made of sufficient length to project at their smaller ends somewhat beyond the ends of the chair when driven into place therein, as shown in Fig. 1.

In order to secure the wedges firmly in position and prevent accidental displacement of the same, I drive into one of said slots *e′ e′*, adjacent to the end of the chair, a key or cotter e^2, the same being of sufficient thickness to cause it to project above the surface of the wedge and prevent the same from moving longitudinally within the chair. I find in practice that an ordinary wrought nail is well adapted for this purpose.

In order to prevent the key or cotter from working out of the slot in the wedge, I form the end of the chair with a projecting ear b^3, arranged to extend over said slot and against which the key bears when driven, so as to prevent the key from being raised out of engagement with said slot. As the said key is driven into the slot it strikes against the web of the rail and its end is turned upwardly, as shown in Fig. 2, so that it is prevented from working backwardly out of the slot by its bent end coming against the projecting ear b^3. The ear b^3, formed as herein described, is, however, not essential, inasmuch as other equivalent devices may be employed to hold said key in position—as, for instance, as shown in Fig. 5, a shallow recess or groove b^4 may be formed in the end of the chair and the key be driven into position within said recess, taking in such case an inclined direction in entering the slot, but being straightened out in passing through the same, its end being bent upwardly upon striking the rail-web, as before described. In this form of construction it is obvious that the upper surface of the recess bears upon the top of the key or cotter in precisely the same manner as does the projecting ear or lug and serves to retain the key in place within the groove.

A main advantage gained by my improved construction in locking devices for securing the adjacent ends of the rails together is that no bolts are used in forming the joints, and at the same time the rail ends are firmly locked in position by the wedges and are strongly braced from different directions by the flanges upon the chair.

One cause of "creeping" of the rails is that the grip of the bolts is often unequal—that is

to say, it is very difficult and often impossible to adjust a bolt so that it presses the splice against the end of one of the rails with a pressure equal to that exerted by other bolts in the adjacent end of the other rail and in the same joint—and it follows that while one rail is gripped very firmly the other rail in the same joint may be comparatively loose, so that the rolling blow from a passing train will cause the loose rail to act against its neighbors as a sledge-hammer and drive them in either direction, thus causing creeping of the track. It is obvious, however, that by my improved construction a very even, strong, and vise-like grip upon the ends of both rails is produced, and the wedges being driven into position from opposite directions firmly secure the ends of the rails from longitudinal movement in either direction. Furthermore, the bottom flanges being gripped within the chair at a point remote from the web or center of the rail, and the chair being cut away or grooved beneath the center of the rail, a very even distribution of the strain is attained and the joint is rendered somewhat elastic and the liability of breakage caused by the excessive rigidity of the so-called "dead-joints," or joints in which there is no elasticity of the rails or chair, is materially decreased. Furthermore, by my improved construction, the joint being short and an even vise-like grip taken of the rails from opposite directions, in case of a low joint the rails will spring on either side of the joint and bend bow-shaped, the same as in the center of the rail, and will spring back into position again after the train has passed, thus avoiding trouble and expense from bent rail ends, it being a well-known fact that with bolt-joints the ends of the rails are liable to bend into a V shape and remain so, thus injuring the rail.

By my construction as herein described an exceedingly strong joint is provided and practically a continuous rail is obtained.

It is obvious that instead of the key shown in Figs. 1 and 2 different forms of keys may be employed—as, for instance, the form shown in Figs. 9 and 10, in which the key is formed from a piece of wire bent into the form shown in Fig. 10. The wedge is formed in the same manner as before, having the transverse grooves e' across its upper surface, and the key F being formed with a straight portion f, adapted to engage one of said grooves e', and having its ends bent at right angles to the straight portion f, so as to project beneath the flange B′ of the chair to hold the straight portion f in engagement with the groove e'. In this form of key one end, as f', is preferably formed with a V-shaped bend and the other end f^2 is left straight.

In use the V-shaped end f' of the key is inserted between the web of the rail and the upwardly-projecting part of the flange B′ above the wedge, and the end f^2 is inserted under the inwardly-projecting portion of said flange B′ at the side of the wedge. The key is then driven into position, as shown in Fig. 9, the straight part f engaging with one of the transverse grooves e' and operating to retain the wedge in place in the chair in precisely the same manner as the key shown in Figs. 1 and 2. It is obvious that the bent ends f' f^2 will when the key is in position exert a downward pressure upon the straight portion f and effectually prevent any displacement of the key. Where this form of key is employed the chair may be recessed or not, as desired, the particular form shown being without either the recess or the projecting ear shown in the other figures of the drawings.

I claim as my invention—

1. The combination, with the track-rails, of a chair having a horizontal base supporting the adjacent ends of said rails and provided with two upwardly-projecting flanges embracing the bottom flanges of the rails and engaging at their upper edges with the webs of said rails, and tapered wedges inserted between said flanges upon the chair and the bottom flanges of the rails, said wedges being provided with transverse grooves, and keys or cotters adapted to be inserted in one of said grooves of each of said wedges and to engage the chair to prevent longitudinal movement of said wedges, substantially as described.

2. The combination, with the track-rails, of a chair having a horizontal base supporting the adjacent ends of said rails and provided with two upwardly-projecting flanges embracing the bottom flanges of the rails and engaging at their upper edges with the webs of said rails, and tapered wedges inserted between said flanges upon the chair and the bottom flanges of the said rails, said wedges being provided with transverse grooves, and keys or cotters adapted to be inserted in one of the grooves of each of said wedges and to engage the chair to prevent longitudinal movement of said wedges, said chair being also provided with overhanging portions adapted to bear upon the upper side of said keys or cotters, substantially as described.

3. The combination, with the track-rails, of a chair having a horizontal base supporting and bearing against the bottom flanges of said rails and provided with two upwardly and inwardly extending flanges embracing the bottom flanges of the rails and bearing against the webs of the rails at their upper edges, said flanges having the lower surfaces of their inwardly-extending portions inclined from end to end, and tapered wedges inserted between said flanges and the bottom flanges of the rails, said wedges being each formed with a rib extending along its upper edge and adapted to engage the angle formed by the bent portion of the flange, said wedges being also provided with one or more transverse grooves, and keys adapted to be inserted in one of said grooves of each of said wedges, substantially as and for the purposes set forth.

4. The combination, with the track-rails, of a chair having a horizontal base supporting

the adjacent ends of said rails and provided with two upwardly-projecting flanges embracing the bottom flanges of the rails and engaging at their upper edges with the webs of said rails, and tapered wedges inserted between said flanges upon the chair and the bottom flanges of the rails, said wedges being provided with transverse grooves, and keys or cotters adapted to be inserted in one of said grooves and to engage the chair to prevent longitudinal movement of said wedge, said chair being provided with projecting ears or lugs adapted to bear upon the upper side of said keys or cotters, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

PRESTON C. DOCKSTADER.

Witnesses:
W. S. HOYT,
GEORGE H. GIRTON.

1819 & 1820 EXHIBIT S19.

KATE S. HOLMES,
Notary Public.

1166

(No Model.)

F. W. PARSONS.

RAILWAY CHAIR.

No. 465,492. Patented Dec. 22, 1891.

Fig. 1.

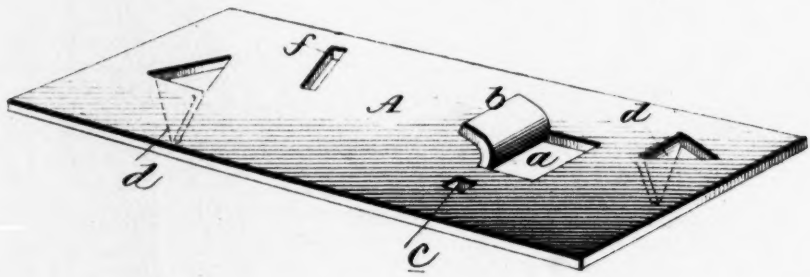
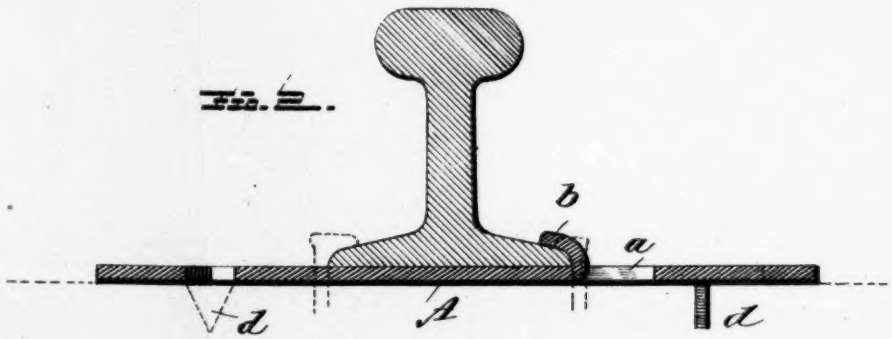


Fig. 2.



Witnesses
L. C. Hills.
E. A. Bond.

Inventor
Francis W. Parsons
by E. B. Stocking
Attorney

UNITED STATES PATENT OFFICE.

FRANCIS W. PARSONS, OF PHILADELPHIA, PENNSYLVANIA.

RAILWAY-CHAIR

SPECIFICATION forming part of Letters Patent No. 465,492, dated December 22, 1891.

Application filed February 5, 1891. Serial No. 380,351. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS W. PARSONS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Railway-Plates, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in railway-chairs; and it has for its object to provide a cheap and durable chair of sheet metal with the flange and prongs struck out from the metal. The prongs are designed to be arranged at different angles to enter the cross-ties either with or across the grain or an angle thereto, as may be deemed best.

The device can be manufactured at a minimum cost, is durable, easily applied, and when in position will hold the rail firmly in place.

Other objects and advantages of the invention will hereinafter appear, and the novel features thereof will be specifically defined by the appended claims.

The invention is clearly illustrated in the accompanying drawings, which, with the letters of reference marked thereon, form a part of this specification, and in which—

Figure 1 is a perspective view of the device ready for use. Fig. 2 is a vertical cross-section through a rail held in place by my device.

Like letters of reference indicate like parts in both views.

Referring now to the details of the drawings by letter, A designates the chair, which is formed of a piece of sheet metal of the required size and form, preferably rectangular, as seen in Fig. 1. It is stamped up at *a* to form the flange *b*, which extends transversely of the plate and adapted to engage and receive the flange of the rail, as seen in Fig. 2. Adjacent to the flange *b* the plate is provided with a spike-hole *c*. Near opposite ends, and preferably at diagonally-opposite corners, the metal is stamped out to form the triangular prongs *d*, which extend upon the side of the plate opposite to the flange *b*, and these prongs may be arranged at any desired angle to enter the cross-ties either with or at right angles to the grain of the wood or at any other angle thereto. They are shown as arranged at right angles to each other, as shown in Fig. 1, so that one will enter the tie at right angles to the other, so as to better brace the plate and prevent both lateral and longitudinal movement thereof.

The manner of use will be readily understood. It is shown in Fig. 2. A spike is driven through the hole *c* in the usual manner, and at a point which will bring the spike upon the other side of the rail I form an elongated slot *f*, which extends at an angle other than a right angle to the edges of the plate, as seen in Fig. 1. This permits of the use of the device with rails having flanges of varying sizes, or two spikes may be driven, one to bind and hold the other.

What I claim as new is—

1. A sheet-metal railway-chair having stamped therefrom a flange to receive and embrace the flange of a rail, a spike-hole in proximity to said flange, a spike-hole near the other end, extending angularly to the ends and sides, and at diametrically-opposite corners triangular prongs stamped from within the body of the chair, substantially as specified.

2. A sheet-metal railway-chair having stamped therefrom near its longitudinal center a curved flange, and at diametrically-opposite corners triangular prongs arranged at right angles to each other, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

FRANCIS W. PARSONS

Witnesses:
H. SUTHERLAND,
L. C. HILLS.

1169

(No Model.)

C. H. DUNHAM, Dec'd.

D. F. DUNHAM, Administratrix.

RAILROAD TIE PLATE.

No. 469,386. Patented Feb. 23, 1892.

FIG. 1.

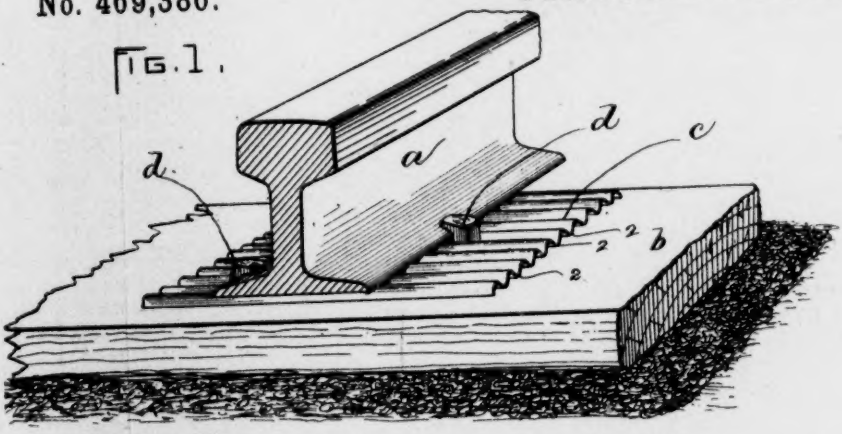


FIG. 2.

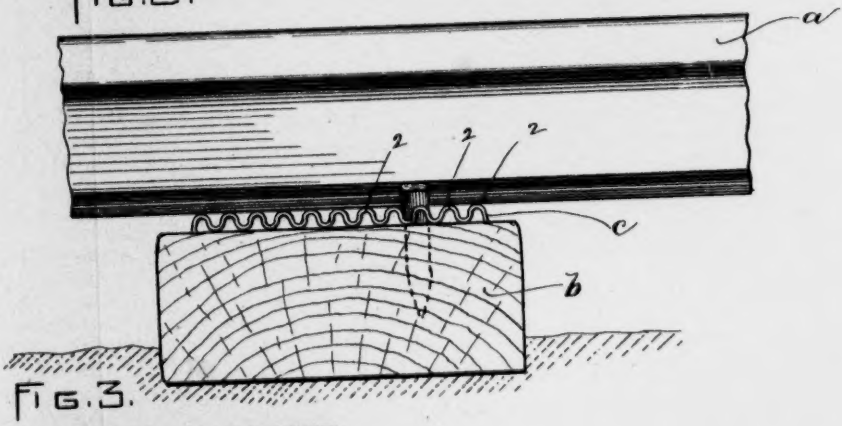


FIG. 3.

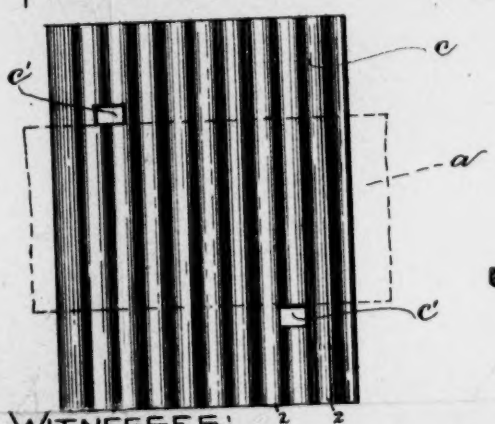
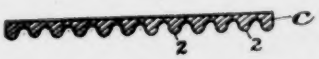


FIG. 4



WITNESSES:
H. Brown.
A. D. Harrison.

INVENTOR:
C. H. Dunham
by Wright Brown Quinby & Atty.
Atty.

UNITED STATES PATENT OFFICE.

CHARLES H. DUNHAM, OF CHICAGO, ILLINOIS; DOROTHY F. DUNHAM ADMINISTRATRIX OF SAID CHARLES H. DUNHAM, DECEASED.

RAILROAD-TIE PLATE.

SPECIFICATION forming part of Letters Patent No. 469,386, dated February 23, 1892.

Application filed March 11, 1891. Serial No. 384,527. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. DUNHAM, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Railroad-Tie Plates, of which the following is a specification.

This invention relates to metallic plates that are interposed between the base of a railroad-rail and the wooden tie by which the rail is supported, for the purpose of preventing the cutting of the fibers of the tie by the continued vertical oscillation of the rail under the weight of the rolling-stock passing over it.

My invention consists in the combination and arrangement of parts, as hereinafter described, and pointed out in the claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a perspective view of a portion of a railroad-tie, a portion of the rail thereon, and my improved corrugated tie-plate interposed between the tie and rail. Fig. 2 represents an end view of the same. Fig. 3 represents a top view of the tie-plate alone. Fig. 4 represents a modification.

The same letters of reference indicate the same parts in all the figures.

In the drawings, *a* represents an ordinary railroad-rail, and *b* represents a wooden tie, forming one of the supports of the rail and resting on the road-bed, as usual.

c represents the tie-plate which constitutes my invention, said tie-plate being interposed between the upper surface of the tie and the base of the rail and secured to the tie both by the weight of the rail resting upon it and by the usual rail-securing spikes *d d*, which are driven through holes *c' c'* in the tie-plate into the tie, the heads of said spikes being formed, as usual or in any suitable way, to engage the flanges of the rail.

In carrying out my invention, I provide the tie-plate with a series of corrugations 2 2 2, extending, preferably, the entire length of the plate. I prefer to so locate the plate that the corrugations will be substantially parallel with the tie *b* and at right angles with the rail *a*, as shown in the drawings.

The chief advantages resulting from the corrugated form of the tie-plate are as follows:

First, the corrugations practically reinforce the metal of the plate to such an extent that a much thinner and lighter plate can be used than if the plate were flat. I have found by experience that a corrugated plate three-sixteenths of an inch thick will be stiffer and better adapted to resist the bending or buckling strain to which it is subjected by the weight of the rolling-stock than a flat plate which is five-eighths of an inch thick. A serious objection to flat-metal tie-plates is that they have to be made of such thickness to enable them to resist the bending or buckling strain imposed upon them that each plate becomes in effect an anvil, taking the blow transmitted by the rail from the rolling-stock and indenting or pounding out the wood of the tie. This difficulty is obviated by the employment of a thin tie-plate, which is made feasible by my improvement.

Secondly, the corrugations in the tie-plate form air-spaces between the bottom of the plate and the tie, preventing the long-continued presence of moisture in the wood under the tie-plate and thus obviating the rapid decay of the wood, which is found to take place under a flat tie-plate, the free access of air afforded by the corrugations to both surfaces of the tie-plate also having a tendency to prevent rusting of the tie-plate.

My invention is not limited to the particular form and arrangement of the corrugations above described. If desired, the corrugations may be arranged otherwise than parallel, and in some cases the plate may be flat on one side (preferably the upper) and corrugated only on the other side, as shown in Fig. 4, this construction affording the desired air-spaces between the tie and plate.

I am aware that it has been proposed to place a corrugated plate or chair in a groove or recess in a tie, said groove being of the width of the base of the rail and the said plate having flat flanges extending up and over the top of the tie each side of the rail. My construction differs from this in that by having the corrugated plate entirely on the upper surface of the tie the ends of the corrugations are left open for the circulation of air to more readily prevent long-continued presence of moisture in the wood under the

plate. Furthermore, by extending the plate considerably beyond the sides of the rail a broad bearing-surface is formed that prevents the rail from tending to cut the tie.

I claim—

The combination, with a railway-rail and its supporting flat-surfaced tie, of a metal plate interposed between said rail and tie, said plate having corrugations open at their ends, whereby air-ducts are formed between the surfaces of the plate and tie, the said plate extending beyond the sides of the rail-base and having holes in such extended portions for the reception of the spikes, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 7th day of March, A. D. 1891.

CHARLES H. DUNHAM.

Witnesses:
S. G. METCALF,
GEO. F. COLWELL.

74,129

1831 & 1832 EXHIBIT S20.

KATE S. HOLMES,
Notary Public.

(No Model.) 2 Sheets—Sheet 1.

F. H. HEATH.

RAIL JOINT.

No. 474,129. Patented May 3, 1892.

Fig. 1.

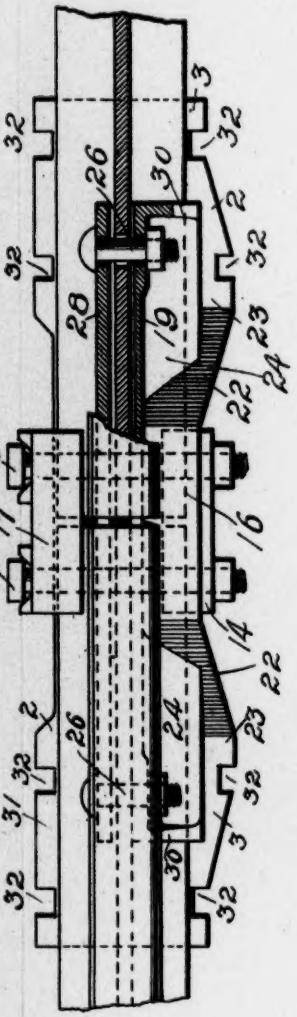
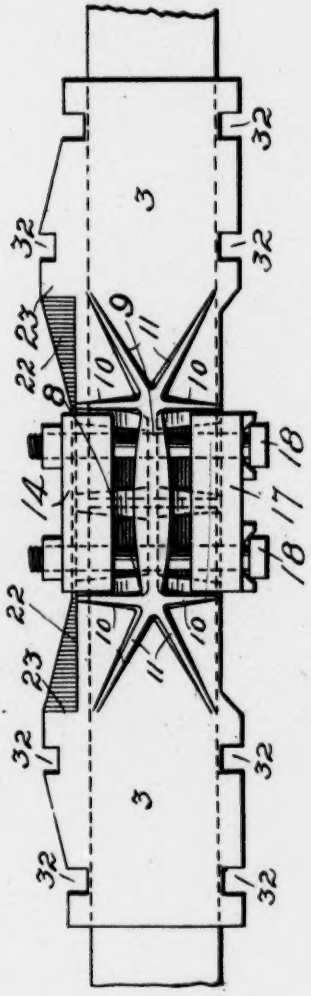


Fig. 2.



Witnesses.
C. E. Van Dorn.
A. Hawley.

Inventor,
Frederick H. Heath.
By Paul & Merwin
Attys.

(No Model.) 2 Sheets—Sheet 2.

F. H. HEATH.

RAIL JOINT.

No. 474,129. Patented May 3, 1892.

Fig. 5.

Fig. 6.

Fig. 7.

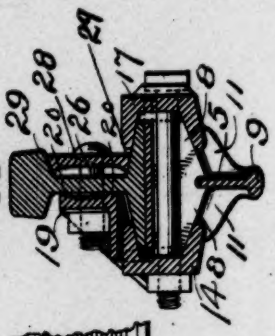


Fig. 3.

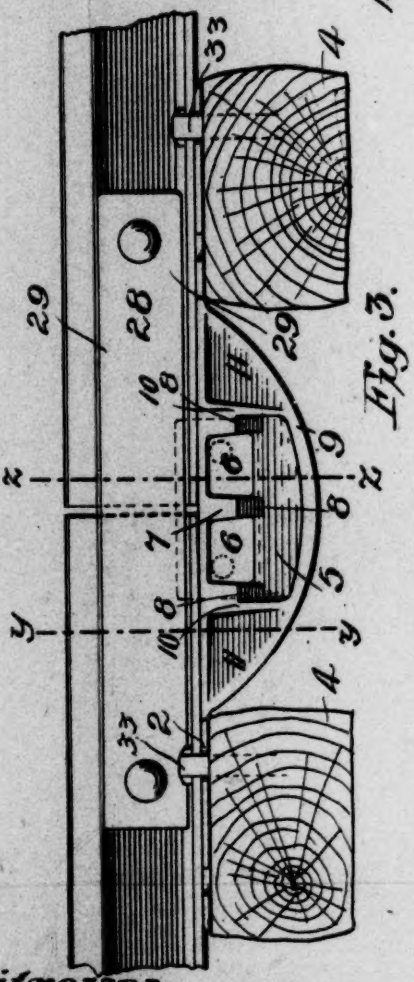
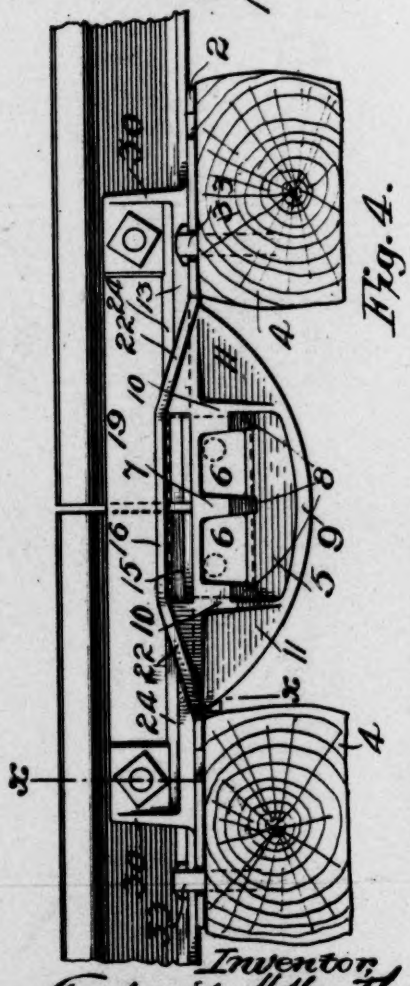


Fig. 4.



Witnesses.
C. C. Van Dorn.
C. F. Hawley

Inventor.
Frederick H. Heath
by Paul & Mercer
his Attys.

UNITED STATES PATENT OFFICE.

FREDERICK H. HEATH, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO THE HEATH RAIL JOINT COMPANY, OF WATERLOO, IOWA.

RAIL-JOINT.

SPECIFICATION forming part of Letters Patent No. 474,129, dated May 3, 1892.

Application filed November 18, 1891. Serial No. 412,263. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK H. HEATH, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain Improvements in Rail-Joints, of which the following is a specification.

My invention relates to a new and improved rail-joint in which the qualities of a tie-plate, rail-chairs, truss-joint, fish-plate, angle-bar, and rail-fastening are all combined within a very small compass and in an extremely simple, light, cheap, and durable form.

The object of the invention is to provide a joint for rails which will have the fewest possible parts and at the same time fulfill every requirement of a tie-plate, rail-support, and joint-fastening; and to this end it consists in a plate adapted to extend across the tops of adjoining ties, in connection with a peculiarly-formed system of integral trusses and integral brace or angle-bar adapted to engage the web of the rail to align the rails, a fish-plate for the other side of the rail and secured on the opposite side of the rail from the angle to the same and said angle-bar by bolts passing through them, and clamps for fixing the rail or rails on said plate.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a plan view of a device embodying my invention, a portion thereof being broken away for clearness. Fig. 2 is a plan view of the rail-joint inverted. Fig. 3 shows the fish-plate side of my joint, the rail-clamps being removed. Fig. 4 is a view of the other side under like conditions. Fig. 5 is a cross-section on the line $x\ x$ of Fig. 4. Figs. 6 and 7 are cross-sections on the line $y\ y$ and $z\ z$, respectively.

There are three parts or portions of my rail-joint, which, serving most important purposes, are all formed in a single piece. These three parts are the tie-plate 2, the upper surfaces of the ends 3 of which serve as the rail-chairs, and which plate extends not only between the ties, but clear across tops of both of them. The upper surface of the plate and the chair portions are all in the same plane. The plate in two ways is strengthened against any depression, warping, or breaking. The first and most important of these is the depending truss, which extends down between the ties 4. This truss itself is made up of several parts, all of which are integral one with the other and with the plate—namely, the main central web 5, which is provided with the openings 6 for the accommodation of the clamping-block bolts. Extending down from the edges of the rail and forming a part of and projecting from the sides of the web are the block or bracket portions 7, which have the inclined sides 8.

On the lower edge of the web 5 I form the expanded rib 9, giving the web a much greater strength. From the ends of this web the transverse and diagonal trusses 10 and 11 extend slantingly up from the central web to the edges of the plate. Second, the web is strengthened by the truss angle-bar or brace arranged on one side of the plate and extending nearly the full length thereof. The inwardly-projecting part is raised and supported upon the vertical projection 13, formed integrally with the plate, and, as will be seen, constituting very reliable trusses over the points of the plate where they meet the inner edges of the ties, thereby preventing any bending or breaking of the plate at these points. The ends of the angle-bar or brace extend about half-way out on the rail-chairs, the vertical portion 13 being straight and lying parallel with the outer edge of the rail-base.

To accommodate the inner and upper clamping-flange of the block 14, I cut away the vertical parts 13 at the middle of the rail-joint, making the opening 15, the top of which is formed by the lower surface of the middle and horizontal portion 16 of the angle-bar and the bottom by the edge of the rail-plate 2. The block 14 has the flaring inner sides adapted to engage the top of the rail-base and the inclined edges 8 of the depending truss, and this block, with the block 17, which is similarly constructed, is clamped in place by the bolts 18 passing therethrough and through the openings 6 beneath the plate, the same being secured as shown. The inner upright portion 19 of the angle-bar or brace is hollowed out slightly on the inside to make the two bearing-edges 20. This hollowing is done both to accommodate the raised letters on the rails and also to give

a firmer grip upon the rail-web. The distance between the inner edges 20 and the inner side of the vertical part 13 is somewhat greater than the width of the part of the rail-base to be accommodated therein. The opening beneath the inwardly-extending parts is also higher than the rail-base, so that rails of different sizes may be secured together in the same joint. Further, in this way the bearing of the angle-plate against the web of the rail is insured. I prefer to raise the middle part of the angle-bar, as shown, and extend the inwardly and upwardly slanting side trusses 22 from the outer edges of the extended parts 23 of the rail-chairs, the inner ends of these trusses being merged into the end of the angle-bar just above the ends of the clamping-blocks 14. The outer portions 24 of the angle-bar or brace are preferably slanted up from the outer edges, so as to reduce the heights of the ends of the part 13, and hence strengthen it.

At the ends of the part 19 I provide the bolt-holes 25, these ends of the bar being thickened, as shown. The bolts 26 extend through these holes and through enlarged holes 27 in the web of the rail, the heads of the bolts being secured in the fish-plate 28, which has the inclined edges 29, adapted to engage the lower side of the tread of the rail and the upper side of the base thereof. The width of this fish-plate is such that it can in no case enter so far as to strike and lie flat against the web of the rail, the office of the plate being, in connection with the angle-bar, to insure the alignment of the rails and also to strengthen the rails themselves and prevent the settling of the tread. To prevent drawing over of the upper edge of the angle-bar, I provide the small brackets 30, formed integrally therewith. At the ends of the plate the edges are extended, as shown at 31 and 23, so as to permit the making of the notches 32 in the edges of the plate to admit the rail-spikes 33, as shown in Figs. 3 and 4. The heads of these spikes jut over onto the top of the rail on the inside of the joint and at the ends of the joint on the other side also, thereby furnishing an extra fastening for the railroad-rails. The short bolts 26, fastened in the angle plate or bar, which is formed integrally with the base, prevents creeping of the rails. It is obvious that the rail-joint may be employed not only at actual joints of ends of rails, but when such a support is required may be arranged at intermediate points of a single rail.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with the rail or rails, of a tie-plate arranged between and extending over adjoining ties, an angle-bar formed integrally with and on the upper surface of said plate and having an inner vertical part to engage the web only of the rail, said vertical part provided with holes, the rail web or webs having holes registering therewith, and bolts arranged therein, for the purpose specified.

2. The combination, with the rail or rails, of a tie-plate whereon the same are adapted to rest, said plate adapted to extend between and across adjoining ties, clamping-blocks thereon, an angle-bar formed integrally with said plate and having, as described, the inner vertical part to engage the rail web or webs only, a fish-plate arranged to engage the tread and the base of the opposite side of the rail or rails, and bolts passing through said plate, through the web or webs, and through the angle-bar, whereby the rail or rails are aligned, strengthened, and fastened, substantially as described.

3. The combination, in a rail-joint, of the rail or rails, with a plate upon the upper surface of which the same are adapted to rest, clamping-blocks for securing the rails on the plate, bolts for fastening the said blocks and extending beneath the said plate, an angle-bar raised on one edge of the plate and having the inwardly-extending part and the inner vertical part to be bolted to the web of the rail and engaging the web only, said inwardly-extending part consisting of a higher horizontal portion and the slanting end parts, and the brackets 30, arranged to strengthen the angle-bar, all parts of said bar being formed integrally with said plate, substantially as described.

4. The combination, with the plate 2, adapted to extend across adjoining ties, of the clamping blocks and bolts therefor for securing the rail or rails thereon, said plate provided with a centrally-depending and integral truss, an integral angle-bar formed on the top of the plate and extending in to engage the web or webs only of the rail or rails, the fish-plate arranged to engage the other side of the rail or rails, and bolts extending through and locking together said fish-plate, rail, web, and bar, substantially as described.

5. The combination, with the plate 2, of the angle-bar formed integrally therewith, and rail clamps and bolts for securing together the bar and rail or rails to be aligned thereby, the space beneath the angle-bar and brace being larger than the rail-base, whereby the bearing is had on the web of the rail, substantially as described.

6. The combination, with the rail or rails, of the tie-plate 2, having the rail-chair ends whereon the rails are adapted to rest, said ends being wider than the rest of the rail, the vertical part or ledge 13, arranged parallel with the base of the rail or rails, the inwardly-extending part having the raised middle portion 16, side trusses 22, extending from the rail-chair ends thereto, the inner vertical part 19, said part grooved on its inner side, whereby bearing-surfaces are provided at the upper and lower surfaces thereof, and the brackets or braces 30, arranged substantially as described, all of said parts being formed integrally.

7. The combination, with the rail or rails, of the tie-plate having the rail-chair ends whereon the rails are adapted to rest, said ends being wider than the rest of the rail, said plate provided with a centrally-depending truss having divided ends extending up to the edges of the plate, means for clamping the rail or rails thereon, and the vertical part or ledge 13, arranged upon the upper surface of the plate and parallel with the rail-base, and the inwardly-extending part jutting inward over the rail-base and having the vertical portion 19 integrally tied or braced therewith, said vertical part and the web or webs having coincident bolt-holes and bolts arranged therein, whereby said part and web or webs are drawn into firm engagement, substantially as and for the purpose specified.

8. The combination, with the rail or rails, of the tie-plate 2, having the extended rail-chair ends, whereon the rails are adapted to rest, said ends being wider than the rest of the rail, said plate provided with an integral centrally-depending truss having divided ends extending up to the edges of the plate, means for clamping the rail or rails thereon, the vertical part or ledge 13, arranged upon the upper surface of the plate and parallel with the rail-base, the inwardly-extending part jutting inward over the rail-base and having the vertical portion 19 integrally tied or braced therewith, and a fish-plate to engage the base and the tread of the opposite side of the rail, said vertical part, the web, and fish-plate provided with coincident bolt-holes, bolts arranged therein, and nuts thereon, whereby said three parts are drawn into solid engagement, substantially as and for the purpose specified.

9. The combination, with the rail or rails, of the plate 2, whereon the same are adapted to rest, the ends of the said plate being provided with the extended edges 23 and 31, notches 32 therein, the integral angle-bar or brace having the inner part adapted to engage the web or webs of the rail or rails, clamping-blocks for securing the same on the plate, the side of said plate opposite said angle-bar, which is integral with the plate, being without vertical projection, the ties and spikes 33, driven into the same and arranged in said notches, the heads of said spikes engaging the tops of the rail base or bases, substantially as and for the purpose specified.

In testimony whereof I have hereunto set my hand this 5th day of November, 1891.

FREDERICK H. HEATH.

In presence of—
C. G. HAWLEY,
F. S. LYON.

1179

(No Model.)

U. H. HANE.

RAILROAD JOINT.

No. 481,171

Patented Aug. 23, 1892.

Fig. 1.

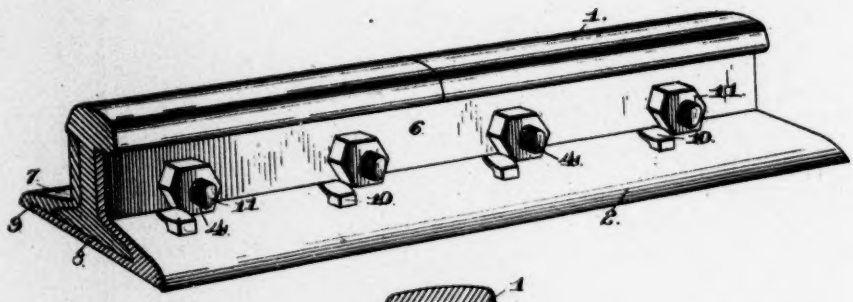


Fig. 2.

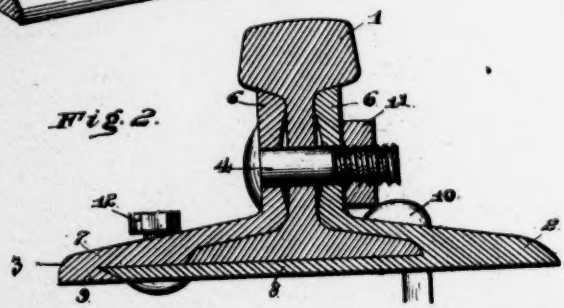


Fig. 3.

Fig. 4.

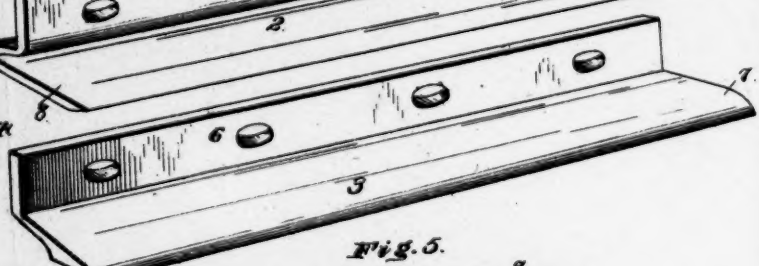
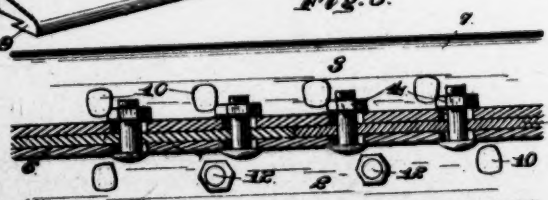


Fig. 5.



Witnesses

Chas. Ford.

N. F. Riley

Inventor

U. H. Hane.

by his Attorneys.

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

URBAN H. HANE, OF LAKELAND, FLORIDA.

RAILROAD-JOINT.

SPECIFICATION forming part of Letters Patent No. 481,171, dated August 23, 1892.

Application filed April 14, 1892. Serial No. 429,132. (No model.)

To all whom it may concern:

Be it known that I, URBAN H. HANE, a citizen of the United States, residing at Lakeland, in the county of Polk and State of Florida, have invented a new and useful Railroad-Joint, of which the following is a specification.

This invention relates to improvements in railroad-joints.

The object of the present invention is to provide a simple and inexpensive railroad-joint in which the meeting ends of the rails will be held perfectly steady and in which nut-locks will be unnecessary.

The invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claim hereto appended.

In the drawings, Figure 1 is a perspective view of a rail-joint constructed in accordance with this invention. Fig. 2 is a transverse sectional view. Fig. 3 is a detail perspective view of the outside fish-plate. Fig. 4 is a similar view of the inside fish-plate. Fig. 5 is a horizontal sectional view.

Like numerals of reference indicate like parts in the several figures of the drawings.

1 designates rails having their meeting ends secured together and supported by an outer fish-plate 2 and an inner fish-plate 3, which are secured to the rails and connected together by horizontal bolts 4, passing through perforations in the webs of the rails and in the vertical portions 6 of the fish-plates. The fish-plates are angular and consist of the vertical portions 6, arranged opposite the webs of the rails, and inclined portions 7, arranged at the bottom flanges of the rails and spiked to the ties. The inner faces of the fish-plates conform to the configuration of the rails. The outer fish-plate is provided with an integral bottom plate 8, extending beneath the rails and across and beyond the same and forming a solid seat, and the inner fish-plate is provided on its lower face with a flange 9, having its edge beveled and adapted to receive the adjacent edge of the bottom plate, which is also beveled, whereby the bottom plate and the inner fish-plate are securely locked, thereby forming a perfectly-solid seat for the rails, which are held perfectly steady. The fish-plates are secured to the cross-ties by spikes 10, which pass through suitable openings of the fish-plates, and those arranged adjacent to the nuts 11 of the horizontal bolts prevent those nuts turning, and thereby dispense with the necessity of employing the nut-locks for this purpose. The inner fish-plate is secured to the bottom plate by vertical bolts 12, which are arranged in the intervals between the cross-ties and which securely fasten the parts together and pass through perforations in the portion 7 of the fish-plate and through perforations of the bottom plate. The spikes on this side of the joint also assist the bolts in securing the fish-plate to the bottom plate and in preserving a perfectly-rigid seat for the rails.

From the foregoing description and the accompanying drawings the construction, operation, and advantages of the invention will be readily understood.

What I claim is—

In a rail-joint, the combination, with the rails, of an outer angular fish-plate provided with an integral bottom plate extending entirely across the lower faces of the rails and beyond the same and forming a solid seat and having its outer edge beveled, the inner fish-plate provided on its lower face with a beveled flange receiving the beveled edge of the bottom plate and securely locking the parts, horizontal bolts passing through the fish-plates and the webs of the rails, spikes passing through the fish-plates and securing the same to cross-ties, those spikes adjacent to the nuts of said bolts preventing the nuts from turning, and vertical bolts passing through the inner fish-plate and the bottom plate and securing the parts together, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

URBAN H. HANE.

Witnesses:
J. C. WILBUR,
J. A. HART.

1182

(No Model.)

W. GOLDIE.

TIE PLATE.

No. 485,030. Patented Oct. 25, 1892.

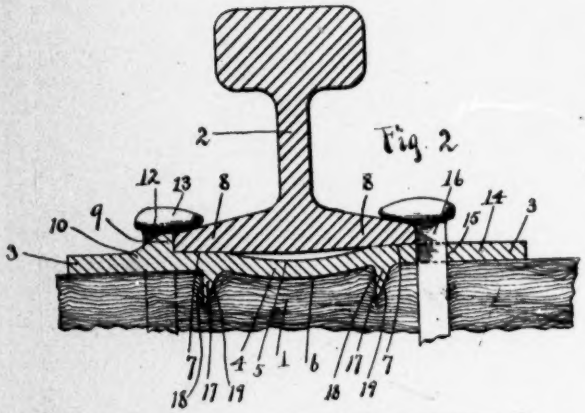


Fig. 2

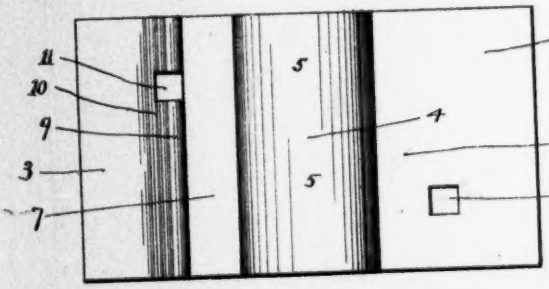


Fig. 3

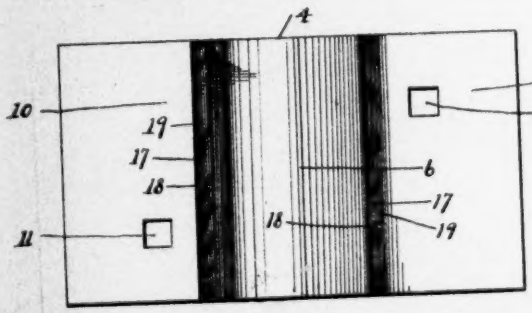


Fig. 4

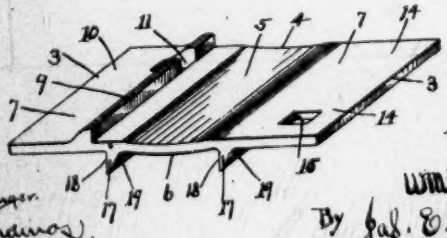


Fig. 1

Attest
J. Burlingame.
Geo. P. Thomas.

Inventor
William Goldie
By Jas. E. Thomas Atty

UNITED STATES PATENT OFFICE.

WILLIAM GOLDIE, OF WEST BAY CITY, MICHIGAN.

TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 485,030, dated October 25, 1892.

Application filed March 17, 1892. Serial No. 425,289. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GOLDIE, a citizen of the United States, residing at West Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Tie-Plates, of which the following is a specification, reference being had therein to the accompanying drawings.

My present invention relates to improvements in tie-plates of the class in which the plate is composed of a thin strip or plate of metal introduced between the rail and tie and held in position by spikes passed through the plate and driven into the tie, the plate being especially arranged for receiving the chafing action of the rail, so as to prevent its cutting into the tie-surface.

The invention consists of a tie-plate having a central portion provided with a transverse concavity in its upper surface to receive the rail and with a transversely-convex under surface having transverse ribs on each lateral side of the convex portion and with laterally-extending end portions having spike-openings adjacent to the edges of the central portion and provided on its upper side with a transverse rib with its inner edge coincident with the inner edge of the spike-opening; and the invention also consists in a tie-plate adapted to rest upon the tie and carry the rail and provided on the portion beneath the rail with a depressed portion having a concave upper and convex under side; and the invention also consists in the combination, arrangement, and construction of the parts and in the operation and effect of the same, as I shall presently proceed to describe in detail, and which will also be especially defined and pointed out in the claims of this specification.

The object of my invention is to provide a tie-plate for resting between the rail and tie, in which the middle portion, which carries the rail, will be supported in such a way as to avoid the common difficulty of depressing the middle portion and elevating the lateral portions by the action of the passing trains.

Another object is to so construct a thin tie-plate as to force its lateral end portions to rest upon the tie and to retain the plate against a tendency to slide or move laterally upon the tie.

Another object is to arrange a tie-plate that can be made of a rolled-metal bar having the proper transverse contour by cutting transversely to the desired width and then punching the required spike-openings.

My invention is fully illustrated in the accompanying drawings, in which the figures of reference used in the following description will be found designating the same parts or elements throughout the several views.

Figure 1 is an isometrical view of my improved tie-plate detached. Fig. 2 is a transverse section of a railroad rail and tie and of my improved tie-plate in position for carrying the rail. Fig. 3 is a plan view of the upper surface of the tie-plate. Fig. 4 is a plan view of the under side of the same.

1 represents a railway-tie, and 2 is the common T-rail resting on the tie.

3 is a tie-plate having a depressed central portion 4 beneath the rail and provided with a transverse concavity or depression 5 on its upper side, while its lower side is provided with a transversely-convex surface 6 beneath the part 5. On each lateral side of the concavity 5 is arranged a plane surface 7, which receives the lateral portions of the base-flange 8 of the rail, and 9 is a transverse rib arranged across the upper side of the outer lateral portion 10 of the plate and with its inner edge resting against the outer edge of the rail-flange 8, and 11 is an opening cut through the rib 9 and the plate, through which and into the tie a spike 12 is driven, the head 13 of the spike reaching over upon the rail-flange in the ordinary way for holding the rail upon the tie. The inner lateral portion 14 of the plate, which extends beyond the rail, is provided with an opening 15 for a spike 16, which is driven into the tie and with its head portion reaching upon the inner edge of the rail-flange. The under side of the portion 4 of the plate is provided directly beneath the parts 7 with transverse outstanding ribs 17, the outer faces 18 of which are provided with abrupt surfaces standing at a right angle with the under side of the plate, while the inner faces 19 of the ribs are of a sloping form to provide a sharp edge at the angle of the two

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sides, which cuts into and depresses the grain of the timber in the surface of the tie.

In practice the plates are placed between the rail and tie with the rib 9 bearing against the lateral outer edge of the rail-flange 8, and the spikes 12 and 16 are then driven to hold the rail in position and to impress the ribs 17 into the tie-surface, and also to impress the convex surface 6 into the tie until the lateral portions 10 and 14 of the plate rest firmly upon the tie-surface, the spike being again tightened down by driving to bring the parts to a firm position after a train has been passed over the road to firmly impress the outstanding ribs and convex surface between into a solid and full bearing.

It is understood that when a rail of the ordinary T form is formed by rolling the form of the under surface of the base-flange of the rail, and which rests upon the tie, is slightly raised in the middle of its width, owing to the clearance required to release the rail from the rolls, and with tie-plates of the ordinary form, having a straight or plane surface for receiving the rail, the central portion of the thin plate is depressed slightly into the tie to bring its supporting-surface to conform to the fullness of the under surface of the rail, and this depression or bending of the plates causes the lateral end portions thereof to rise from the tie, so that the plate really presents but little more surface for resting upon the tie than is covered by the bottom of the rail, whereas by forming the depression 5 and the convex surface 6, as shown, beneath the rail the rail is caused to rest firmly upon the plate by the lateral portions of its under surface, and the convexity of the under side of the tie-plate causes the timber beneath the center of the rail to be firmly compressed to a solid bearing, so that the action of the weight of the rail tends to straighten out the curve of the depressed central portion, and thereby transfers a portion of the strain or weight carried by the plate to the lateral end portions, so that they are thereby held to snug contact with the tie-surface and form a firm and solid bearing for the rail, and prevent any canting or severing action of the rail.

It will be noticed that the full or depressed surface 6 depresses the fiber of the wood, so as to form a solidly-compressed section for supporting the middle of the convexity, so that any heavy strain placed upon the lateral surfaces 7 will have a tendency to straighten out the curve of the depression until the under surface of the rail-flange comes to a full bearing on the plate, and this action going on gradually as the road is used allows the lateral end portions to retain their full bearing upon the tie after the road has been used for a long time, as when the full bearing of the parts is obtained and the plate entirely conforms to its bearing on the tie the wood directly beneath the rail has become so compact and settled in place that slight changes only in the form of the supporting-surface will obtain and a sure and reliable support for the rail is provided, and the plate being provided with the rib for contact with the outer lateral edge of the rail-flange and with the lower transverse ribs for entering the tie affords a great resistance against the lateral outward strain upon the rail exerted by the passing trains, so that a firm and solid support against spreading the rails is provided, and at the same time a large area of surface is presented against the lateral outer edge of the rail-flange to provide against chafing the neck of the spike.

It will be understood that the cheapest and most economical way to manufacture the tie-plate is to roll a blank bar to the proper thickness and with a transverse contour corresponding to the contour of the tie-plate and then cut off the plates to the required width and punch the spike-holes in their proper position.

Of course it will be understood that the main and most important feature of my invention is the depressed portion for supporting the rail, and while I have illustrated the most convenient form and arrangement for general use, I do not limit my improvement entirely to the special arrangement of the parts of the tie-plate shown, as very many minor changes in the several parts can easily be made and still produce the same general result and effect, and therefore—

I claim as my invention as follows:

1. A tie-plate for supporting railroad-rails and having a middle portion for carrying the rail and provided on its upper side with a transverse depression and with a transverse convexity on its under side and having lateral portions extending on each side of said middle portion and provided with spike-openings, substantially as set forth.

2. A tie-plate for supporting railroad-rails, having its middle portion bent transversely to form a transverse depression on its upper side and a convex depression on its under side and provided with laterally-extending portions having spike-openings, substantially as set forth.

3. A plate for supporting railroad-rails upon the tie, and provided on its central portion beneath the rail with a depressed portion having a concave upper and a convex under side, and with laterally-extended portions for resting on the tie-surface, substantially as set forth.

4. A tie-plate for railroad-rails, consisting of a plate of metal having spike-holes on its lateral end portions and having a portion between the spike-holes provided with a transversely-concave upper side and a convex under side, substantially as and for the purpose set forth.

5. The combination of a railroad rail and tie with a tie-plate between the rail and tie and having its middle portion beneath the rail

provided with a transverse concave depression on its upper side presented toward the rail, and with a convex under surface and transverse ribs 17 embedded into the tie, and with the rib 9 against the lateral outer edge of the rail-flange and having the lateral portions 10 and 14 resting on the tie and provided with spike-openings, and the spikes driven through said openings and into the tie, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM GOLDIE.

Witnesses:
JAS. E. THOMAS,
T. FLUES.

1187

(No Model.)

B. REECE.

WEAR PLATE FOR RAILWAY TIES.

No. 488,662. Patented Dec. 27, 1892.

Fig. 1.

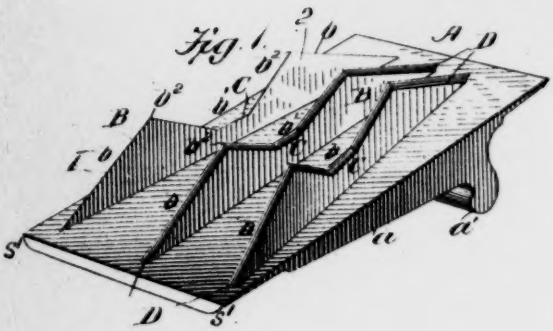


Fig. 2.

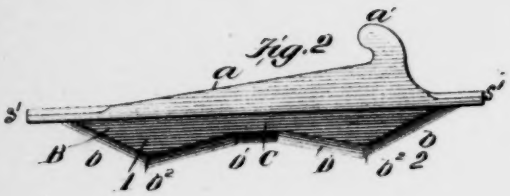


Fig. 3.

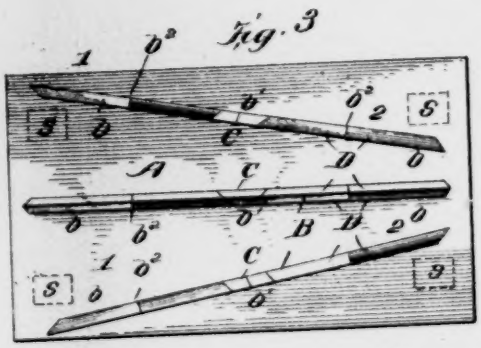


Fig. 4.

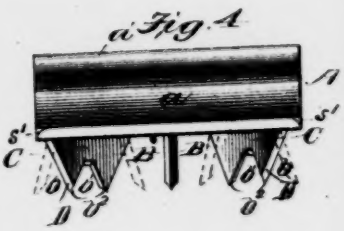
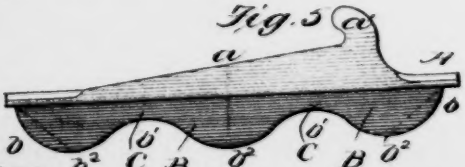


Fig. 5.



Witnesses
F. R. Cornwall.
G. M. Coffenbaver.

Inventor
Benjamin Reece
by F. W. Ritter Jr.
Atty.

UNITED STATES PATENT OFFICE

BENJAMIN REECE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE Q. AND C. COMPANY, OF SAME PLACE.

WEAR-PLATE FOR RAILWAY-TIES.

SPECIFICATION forming part of Letters Patent No. 488,662, dated December 27, 1892.

Application filed February 6, 1892. Serial No. 420,500. (No model.)

To all whom it may concern.

Be it known that I, BENJAMIN REECE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Wear-Plates for Railway-Ties; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, wherein—

Figure 1 is a perspective view of the bottom or underside of a wear plate embodying my invention. Fig. 2 is a side elevation of such a wear plate. Fig. 3 is a bottom plan view of the same. Fig. 4 is an end view, and Fig. 5 is a side elevation of a modification.

Like symbols refer to like parts wherever they occur.

My invention relates to the construction of that class of devices commonly termed "wear plates" and which are, in track laying, interposed between the tie and the rail to prevent the rapid destruction of the tie by the vibration of the rail and the consequent breaking of the fiber of the tie whereby the tie becomes water soaked and decays at the point of support for the rail.

In order to obtain the best results in the construction of wear plates—they should be of such a character that they can be so applied to the tie as to have uniform bearing thereon at the time of application, to avoid any subsequent rocking of the plate which would tend to loosen the rail spikes and break the fiber of the tie: and it is also desirable that they should be of such a construction as to prevent any lateral movement or creeping of the plate, so that a solid and stable rail bearing is obtained adapted to sustain the concentrated weight and thrust imposed on the rail by a passing train. Heretofore, in the construction of this class of devices two general methods have predominated, viz: first, the formation of a wear plate with continuous ribs or flanges on its under surface and longitudinal therewith, said flanges adapted to enter the tie parallel with the grain of the wood, thus separating the fiber without injury thereto: and second, the formation of the wear plate with transverse serrated flanges on its under surface, which flanges bisected the grain of the wood. In the first construction, when the wear plate is driven home, there is always a tendency of the plate to rock or vibrate on its transverse center, until such time as the repeated blows of passing trains have settled the plate at its center, and such rocking or vibration of the plate not only tends to loosen the spikes, but also to part the fiber of the tie at the edges of the wear plate. It also prevents the proper application of the spikes in the first instance. As to the second construction, viz: the notched or serrated transverse flanges, while intended to prevent the lateral movement or creeping of the plate on the tie, act to sever the fiber of the tie and increase the liability of the wood to absorb moisture, with all the evils incident thereto. These prevailing types of tie plates have also revealed fundamental defects as follows:— where the plates have been made sufficiently light to preserve the flexibility of the tie, they have been found too weak to resist the strains impinging on the plate under the edges of the foot flange of the rail, which weakness tended to bend, buckle or break the plate immediately under the margin of the foot flange of the rail. Where the tie and wear plate have been made sufficiently strong and heavy to resist buckling and fracture on the line of contact with the edges of the foot flange of the rail, the flexibility of the tie is lost, and the heavy chair acts as an anvil to receive the blow of the moving load upon the rail.

The object of my present invention is to overcome these defects, and consists primarily, in providing a wear plate with a rib or ribs of V or other underneath truss forms beneath the margins of the foot flange of the rail, and adapted to truss the rail at that point, which construction, while preserving the flexibility of the tie, will at the same time afford ample stiffness and strength to overcome the tendency of the plate to buckle and bend upward at the point of contact with the edges or margins of the foot flanges of the rail.

A second feature of the invention resides in providing the wear plate on its under surface with serrated longitudinal flanges or ribs, or flanges of unequal depth at different points,

whereby the wear plate will sink uniformly at all points under the settling blows, and apply itself equally to the face of the tie, whereby all subsequent rocking of the wear plate is obviated, and I arrange the flanges on the under surface of the wear plate generally in the line of the longitudinal axis of the plate, or so as to enter the tie substantially in line with the fiber of the wood, but preferably somewhat obliquely to the said axis, whereby the resiliency of the fiber of the wood is utilized to clamp the flange and prevent the endwise movement or creeping of the wear plate, which construction or its equivalent embodies one feature of my invention.

There are other minor features of my invention, all as will hereinafter more fully appear.

I will now proceed to describe my invention more fully, so that others skilled in the art to which it appertains may apply the same.

In the drawings, A indicates the wear plate of general wedge form, or having its wearing face *a* somewhat inclined to present the rail head properly to the tread of the passing wheel, said incline terminating above in an abutment or shoe *a'*, against which one flange of the rail impinges.

B B indicate flanges or ribs on the under surface of the wear plate A and at right angles thereto, said flanges, (of which there may be any number according to the width of the plate) standing at right angles to the plane of the wear plate and extending longitudinally thereof so as to enter the tie substantially parallel with the grain of the wood. In order to avoid exposed "checks" (or separation of the fiber) in the tie, these flanges are preferably less in extent than the wear plate, so that the ends of the wear plate shall extend beyond or overhang the flanges, and said flanges are also inclined at both ends as at *b b*. In addition thereto, the longitudinal flanges are serrated or reduced in width at intervals as at *b'* to form a series of entering points b^2 which cause the plate to sink uniformly at all points under the settling blow by which they are applied to the tie. Usually the serrations or serrations of the flange at *b'* is not extended down to the plate, sufficient of the flange being by preference left to form a bridge C which maintains the stiffness of the wear plate and prevents the buckling thereof which might otherwise occur. It is also desirable in order to facilitate the insertion of the flanges in the tie without injury to the fiber, that the edges of the flanges should be beveled, and if different sections of the length of the flange (as for instance 1 and 2, Fig. 3) are reversely beveled, there will be a tendency of the said beveled portions to spring in reverse directions (see Fig. 4 dotted lines) and this of itself will prevent the longitudinal movement or creeping of the wear plate. This effect can be increased by arranging the flanges, either in part or in whole, slightly oblique to the longitudinal axis of the plate (see Fig. 3) and in case two or more parallel longitudinal flanges are used, one flange may be beveled in one direction, the rest in opposite direction, as indicated in Fig. 1 of the drawings. The bevel of each edge, in case of continuous flanges, is preferably on the outside, so that the spring of the flanges is toward each other, thereby confining and compressing the intermediate fiber, while the fiber to the outside of the flange retains its normal position. The confining and compressing of the intermediate fiber, especially in the case of the oblique arrangement of the flanges, renders the support of the plate more solid and is of material advantage at that portion of the plate immediately beneath the outer flange of the rail where is concentrated the weight and thrust of a passing train. Furthermore, the flanges upon the under side of the plate coact with the plate and inclined rail seat so as to reinforce the plate and prevent its buckling at the foot of the incline without destroying the desirable flexibility of the plate which would result if the plate was thickened up to support the increased strain at said point.

In order to ease the wear plate and obviate any tendency of the marking or checking of the rail which might induce fracture thereof at such point, and also to avoid any tendency of the plate to embed in the tie to the injury of the fiber, the wear plate is slightly beveled along its longitudinal edges as at *s' s'*.

The varying depth of the flange not only prevents the rocking of the plate on its transverse center, but if the bridge sections C are retained, they maintain the rigidity of the plate as effectively, as if a flange of equal depth throughout was employed.

The wear plate hereinbefore described may be employed either with or without rail spikes, (as indicated in dotted line S S in Fig. 3) or other suitable fastenings in manner well known to those skilled in the art.

There are several methods of forming the construction hereinbefore set forth, but in practice I have found it satisfactory to cast the same, forming it of malleable iron or steel, or other suitable metal, and in this instance, the construction can be conveniently changed by forming the shoe or abutment *a'* straight to permit an easy draft, or should it be desired to retain the overhanging ledge, a core print will be found useful.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. A wear plate for railway ties provided on its under side with a longitudinal rib or ribs formed with an underneath trussed portion beneath the margin of the foot flange of the rail and adapted to truss the plate at that point, substantially as and for the purposes described.

2. A wear plate for railway ties provided on its under face with a rib or ribs of V or other underneath truss form beneath the margin of

the foot flange of the rail, said rib adapted to truss the plate at that point, substantially as and for the purposes described.

3. A wear plate for railway ties provided with one or more serrated longitudinal flanges, the different sections of said flange or flanges having reversely beveled edges: substantially as and for the purposes specified.

4. A wear plate for railway ties having one or more longitudinal flanges composed of entering points connected by bridges of less width than the flange at the entering points: substantially as and for the purposes specified.

5. A wear plate for railway ties having one or more obliquely arranged serrated flanges: substantially as and for the purposes specified.

6. A wear plate for railway ties having on one face an inclined rail seat, and on the other face a rib or ribs formed with an underneath trussed portion beneath the margin of the foot flange of the rail; substantially as and for the purposes described.

7. A wear plate for railway ties having on one side a rail seat, and on the opposite face one or more serrated flanges obliquely disposed to the longitudinal axis of the plate, substantially as and for the purposes described.

8. A wear plate for railway ties having on one face an inclined rail seat, and on the opposite face one or more serrated flanges arranged obliquely to the axis of the plate: substantially as and for the purposes specified.

In testimony whereof I affix my signature in presence of two witnesses.

BENJAMIN REECE.

Witnesses:
F. W. RITTER, Jr.,
M. P. CALLAN.

1192

(No Model.)

J. CHURCHWARD.

WEAR PLATE.

No. 492,528. Patented Feb. 28, 1893.

Fig. 1.

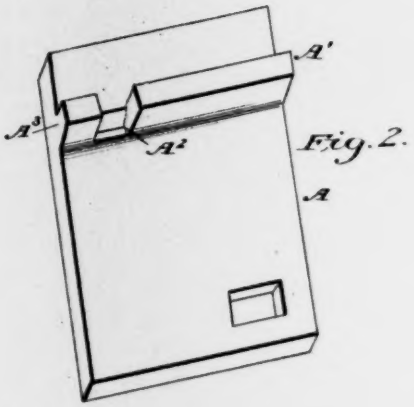


Fig. 2.

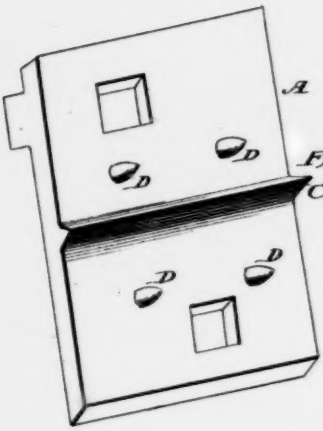
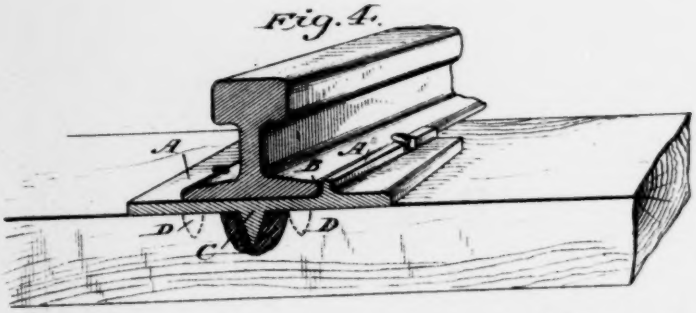


Fig. 3.

Fig. 4.



James Churchward
Inventor.

Witnesses.
Percy D. Griffith
A. B. Chubb

by Field & Co
Attorneys

UNITED STATES PATENT OFFICE.

JAMES CHURCHWARD, OF BROOKLYN, NEW YORK.

WEAR-PLATE.

SPECIFICATION forming part of Letters Patent No. 492,528, dated February 28, 1893.

Application filed February 16, 1892. Serial No. 421,780. (No model.)

To all whom it may concern:

Be it known that I, JAMES CHURCHWARD, a subject of the Queen of Great Britain, and a resident of Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in Wear-Plates, of which the following is a specification.

My invention relates to railway appliances, and its object is to provide a wear plate for insertion between the tie and the base of the rail, to prevent injury to the tie by passing loads, which will securely hold the rail and prevent it from buckling, and which will take off all lateral strain on the spikes and also prevent the rail from spreading or shifting laterally.

The invention consists of a wear plate constructed as hereinafter described and claimed, and as illustrated in the drawings forming a part hereof, in which similar letters of reference denote corresponding parts in all the views.

Figure 1 is a longitudinal section of the wear plate. Fig. 2 is a perspective view showing the upper face of the plate. Fig. 3 is a perspective view showing the lower face of the plate; and Fig. 4 is a perspective view of the plate as applied to a rail and tie shown only in part.

The plate A which is of any suitable metal, may be of any desired dimensions and is rectangular in contour. Upon its upper face near one end is formed integrally therewith a vertical rib A′ extending from one side of the plate nearly but not quite across the plate, terminating at a recess A^2 ranging at a right angle to the rib and longitudinally of the plate, in the base of which recess is formed an opening to receive a railway spike, a similar opening for a like purpose being formed near the other end of the plate and in similar relation to the other side edge of the same.

The recess A^2 may extend entirely across the end of the rib A′, as shown best in Fig. 2, in which event a shorter rib A^3 corresponding in cross section to the rib A′ is formed on the plate beyond the recess and in alignment with the rib A′ and extending to the other side of the plate.

At the point of junction of the base of the inner face of the ribs A′ A^3, and the upper face of the plate A, a metal fillet B is placed, which is preferably forced into position by means of any suitable metal rolling machine, the object of the fillet being to give to the plate and rib a proper face to receive the edge of the base flange of the rail. The introduction of the fillet at the point stated permits the base flange of the rail to have an easy seat and prevents said flange from buckling as would happen were the rounded edge of the rail flange to abut against the right angular junction point of the ribs and plate. The fillet also strengthens the junction of the ribs and plate and prevents fracture at that point.

Upon the lower face of the plate A and about centrally thereof is formed a depending V-shaped flange C, extending transversely from side to side of the plate. This flange when the plate is in position upon the tie extends across the grain of the tie and when embedded in the tie prevents lateral movement of the plate, and if found desirable a similar flange C′ may be formed upon the under face of the plate substantially in vertical alignment with the fillet B, as shown in dotted lines in Fig. 1.

As a further precaution against lateral shifting of the plate A, two or more spurs D, are or may be formed on the lower face of the plate at either side of the flange C arranged as shown best in Fig. 3 or otherwise arranged as may be preferred, which spurs entering the tie reinforce the V-shaped flange or flanges.

In applying the plate to use it is placed transversely of the tie as shown in Fig. 4, the V-shaped flange or flanges and the spurs entering the tie across its grain as shown, and the rail is then positioned thereon and secured by spikes as shown in Fig. 4, and as the impact of passing loads serves to force the flanges and spurs well into the tie, the plate is held by them and the spikes against lateral movement outwardly on the tie as well as against transverse movement thereon and the plate is also held from rattling. Moreover the interposition of the fillet to form a bearing surface for the outer edge of base flange of the rail, gives the rail a snug fit and as before stated precludes buckling of the flange and consequent unsteadiness of the rail.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

A wear plate for railways, formed on its upper face at one end with aligning transverse ribs, one longer than the other, the longer rib extending from one side edge of the plate partially across the width of the plate and the shorter rib extending to the other side edge of the plate a recess intervening said ribs and having a spike aperture in its base, a fillet located at the point of junction of the inner faces of said ribs and the upper face of the plate a transverse V-shaped flange formed on the under face of said plate, and series of spurs depending from said plate at either side of said flange, substantially as shown and described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 15th day of February, 1892.

JAMES CHURCHWARD.

Witnesses:
M. V. CRONIN,
M. CASSIDY.

1869 & 1870 EXHIBIT S25.

KATE S. HOLMES,
Notary Public.

1196

(No Model.)

B. REECE.

METHOD OF MAKING RAILROAD TIE PLATES.

No. 494,692. Patented Apr. 4, 1893.

Fig. 1.

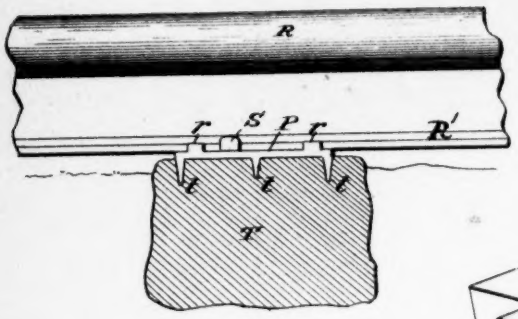


Fig. 5.

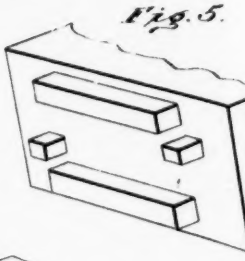


Fig. 2.

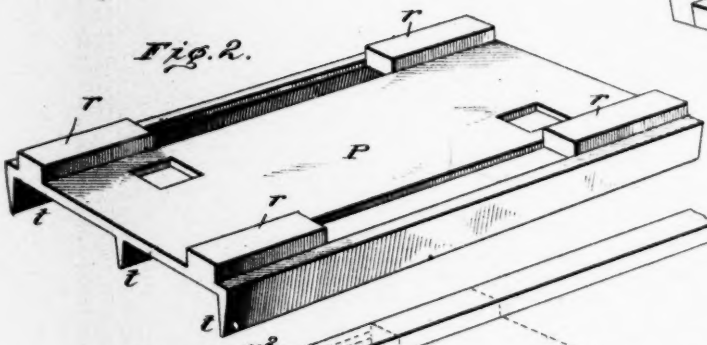


Fig. 3

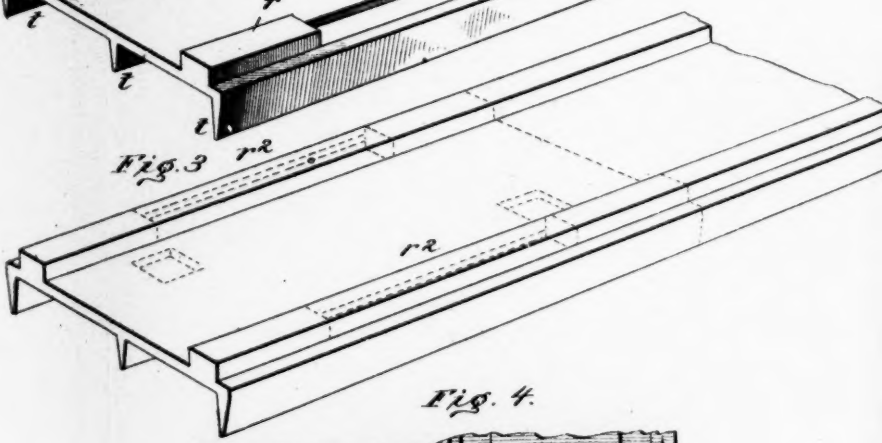
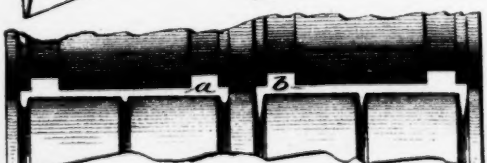


Fig. 4.



Witnesses
Wm. E. Doyle.
D. Darley.

Inventor
Benjamin Reece
by F. W. Ritter
Attorney

UNITED STATES PATENT OFFICE.

BENJAMIN REECE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE Q. & C. COMPANY, OF SAME PLACE.

METHOD OF MAKING RAILROAD-TIE PLATES.

SPECIFICATION forming part of Letters Patent No. 494,692, dated April 4, 1893.

Application filed October 27, 1892. Serial No. 450,145. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN REECE, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in the Method of Making Railroad-Tie Plates; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, wherein—

Figure 1, is a view of a portion of a rail and tie, and an interposed tie-plate. Fig. 2, is a detached, perspective view of a tie plate. Fig. 3, is a perspective view of a portion of a bar adapted for making tie plates. Fig. 4, is a view of a portion of two rolls, showing passes adapted to produce a tie-plate bar of the character shown in Fig. 3, and Fig. 5, is a perspective view of a portion of a punch adapted to remove the portions of rib from the plate blank to form the foot flange abutments, and at the same operation punch the spike holes in the tie-plate.

Like symbols refer to like parts wherever they occur.

My invention relates to the method of making what are termed tie-plates, or wear-plates, used in track laying to protect the tie, prevent the breaking of the fiber thereof, and the water soaking and decay incident thereto which results in the rapid destruction of the tie. Experience has shown that such plates should be sufficiently light and elastic to preserve the advantages due to the resiliency of the tie, sufficiently strong beneath the foot flange of the rail to avoid buckling and breaking, and of a character to prevent the creeping of the plate on the tie, and any movement of the rail on the plate which would bring a lateral strain on the spikes. To meet these requirements, the best forms of tie-plates have been constructed of light plate, with longitudinal truss ribs on the under surface and a series of stops or abutments for the foot flange of the rail upon the upper surface. By the methods now commonly employed it is not only difficult, but laborious, and more or less expensive to produce tie-plates having the characteristics specified.

The object of the present invention is the rapid and economic production of such tie-plates; and to this end, the invention generally stated consists in first forming the plate blank with longitudinal ribs in different planes upon opposite faces, and then punching out sections of the ribs from one (the upper) face to form abutments for the foot flange of the rail; all as will hereinafter more fully appear.

I will now proceed to describe my invention more fully, so that others skilled in the art to which it appertains may apply the same.

In the drawings T indicates the tie, R the rail, and P the interposed tie-plate. The tie-plate P is provided on its under surface with one or more longitudinal ribs *t*, which enter the tie in line with the fiber, and said ribs serve to truss the light plate affording it support against buckling under the foot flange of the rail without materially reducing its flexibility; said ribs also prevent the creeping of the plate without breaking the fiber of the tie.

Upon the upper surface of the tie-plate P, but in different vertical planes from the ribs *t*, are a series of projections *r*, which serve as abutments for the foot flange R′ of the rail, prevent the lateral movement of the rail on the plate, and undue draft or drawing strain on the spikes S.

To cheaply and expeditiously manufacture a tie-plate of the general character hereinbefore specified I first produce a blank—or preferably a bar constituting a multiple of the blank—having upon its opposite faces a series of longitudinal ribs arranged in different vertical planes—which can readily be done by drop forging, or preferably by means of rolls, such as shown in Fig. 4, having passes *a b*, and then subject the plate or bar to punches which strike out sections r^2 of the ribs and plate, thus forming the abutments *r*, to confine the rail, and removing such portions of the rib as would prevent the foot flange of the rail from resting directly on the tie-plate. In case the tie-plates have been formed in multiple (as in Fig. 3), which is the most expeditious for manufacturing purposes, the bar will be severed into sections as indicated by the transverse dotted line, Fig. 3. If desired the spike holes can be

TORN PAGE

punched in the plate by the same operation which removes the rib sections r^2 to form the abutments r, for the foot flange of the rail.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

The method herein described for making tie-plates, which consists in first producing a blank having ribs upon opposite faces and in different vertical planes, and then striking out sections of the plate and ribs upon one face to form a seat and abutments for the foot flange of the rail; substantially as and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 24th day of October, 1892.

BENJAMIN REECE.

Witnesses:
RICHD. W. WRIGHT,
GEO. H. BRYANT.

KATE S. HOLMES,
Notary Public.

1200

(No Model.)

W. W. HOLMES.

RAILWAY TIE PLATE.

No. 495,807. Patented Apr. 18, 1893.

Fig. 1.

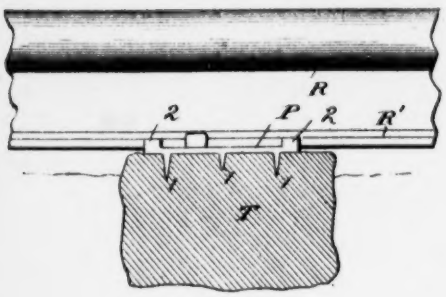


Fig. 2.

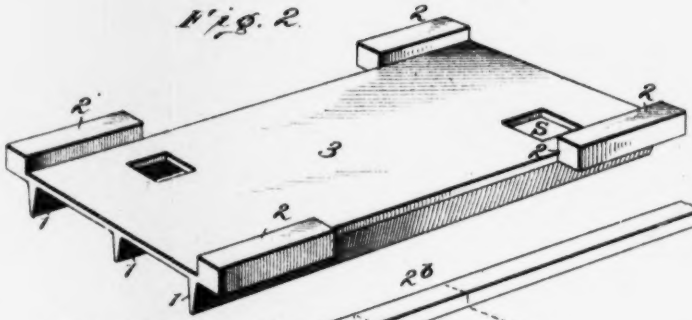


Fig. 3.

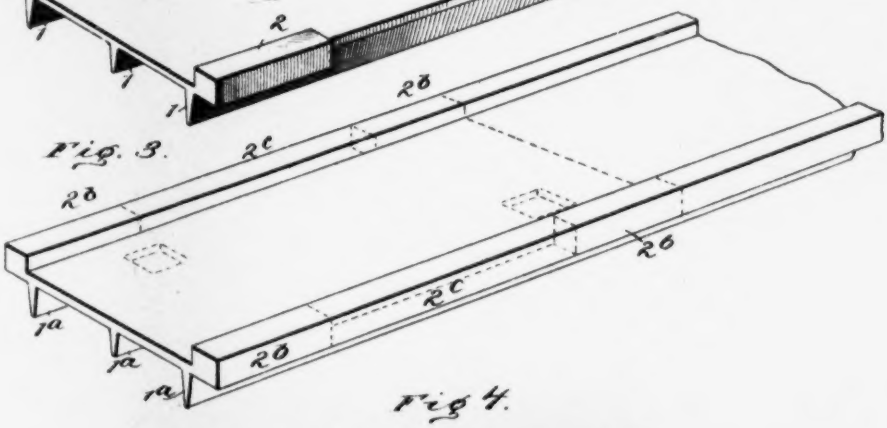
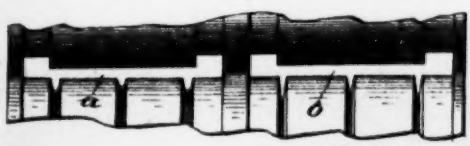


Fig 4.



Witnesses
Edwin L. Bradford
Wm. E. Dyer.

Inventor
William W. Holmes
by F. W. Rutter Jr
Attorney

1201

UNITED STATES PATENT OFFICE.

WILLIAM W. HOLMES, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE Q. & C. COMPANY, OF SAME PLACE.

RAILWAY-TIE PLATE.

SPECIFICATION forming part of Letters Patent No. 495,807, dated April 18, 1893.

Application filed November 5, 1892. Serial No. 451,095. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. HOLMES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Railway-Tie Plates; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, wherein—

Figure 1, is a view of portions of a rail and tie, and an end view of an interposed tie plate embodying my invention. Fig. 2, is a detached perspective view of a tie plate embodying my invention. Fig. 3, is a perspective view of a portion of a bar adapted to the making of my improved tie-plate, and Fig. 4, is a view of portions of two rolls adapted to produce the tie-plate-bar shown in Fig. 3.

Like symbols refer to like parts wherever they occur.

My present invention relates to the construction of that class of railway tie-plates, wherein the plate is formed with one or more truss ribs upon its under surface, and a series of projections or abutments on its upper surface for the foot flange of the rail; and has for its object such a form of tie plate as will permit of its being rapidly and economically produced without weakening the structure of the plate proper.

To this end, the invention generally stated, consists in a tie plate having on its under surface one or more longitudinal truss ribs, and on its upper surface and projecting laterally from its edges a series of abutments for the foot flange of the rail substantially as will hereinafter more fully appear.

I will now proceed to describe my invention more fully so that others skilled in the art to which it appertains may apply the same.

In the drawings R indicates the rail, R′ the foot flange thereof, T the tie, and P a tie-plate interposed between the rail and tie. This tie-plate P, I form with one or more longitudinal truss ribs 1 upon its under surface, said ribs so disposed as to permit the plate to be punched at the desired points for the spike holes *s;* and also with a series of abutments 2, 2, upon its upper surface and projecting laterally therefrom, so arranged as to form and border the plane 3, which constitutes the seat for the foot-flange R′ of the rail.

In order to rapidly and economically manufacture a tie-plate of the general form set forth I first produce a plate or bar (see Fig. 3) having upon one face one or more longitudinal ribs 1^a and on the opposite face adjacent to the edges of the bar longitudinal ribs 2^b—and such a bar can be readily produced by rolls having passes *a b* as shown in Fig. 4. This bar is then subjected to punches (not shown) which strike out the sections 2^c (see Fig. 3) thus leaving the abutments 2 (see Fig. 2) which project laterally from the edges of the tie-plate, and prevent any lateral movement of the rail. Owing to the location and arrangement of the abutments 2, 2, the flexibility of the plate is not diminished, and at the same time the plate can be manufactured by economical methods without material loss of substance, and without weakening the plate beneath the foot-flange of the rail where the tendency to buckle and break occurs.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A railway tie-plate having one or more truss ribs on its under surface, and on its upper surface a series of abutments which project laterally from and above the edges of the plate; substantially as and for the purposes specified.

2. A railway tie-plate having a truss rib on its under surface adjacent to the lateral edges of the plate, and on its upper surface abutments which project laterally from and above the edges of the plate; substantially as and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 25th day of October, 1892.

WILLIAM W. HOLMES.

Witnesses:
S. F. JOHNSON,
GEORGE A. POWELL.

(No Model.)

W. W. WORTHINGTON.

METHOD OF MAKING RAILROAD TIE PLATES.

No. 506,963. Patented Oct. 17, 1893.

Fig. 1.

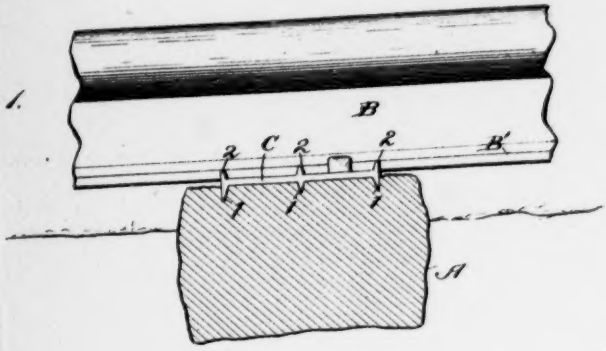


Fig. 2.

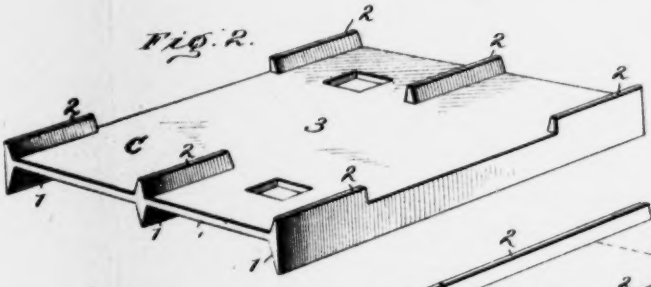


Fig. 3.

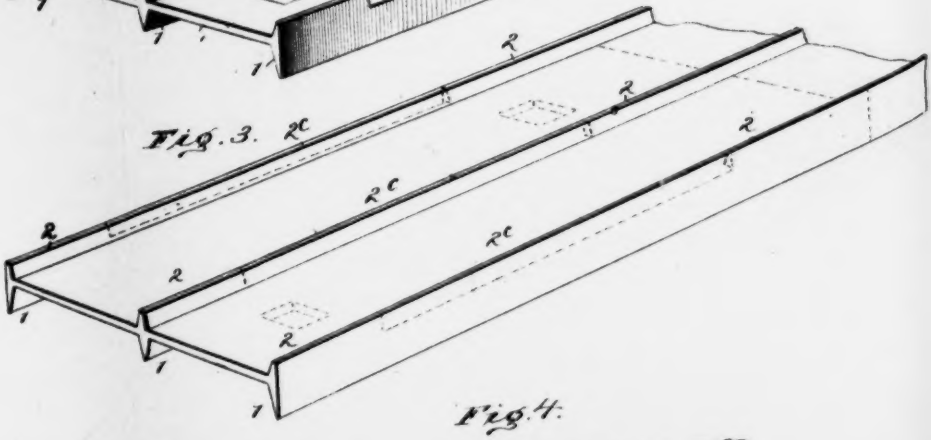
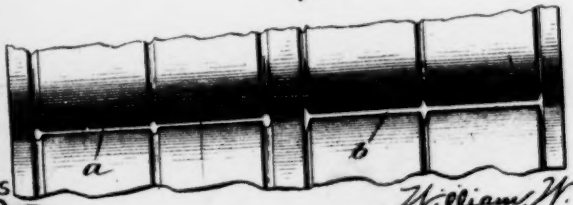


Fig. 4.



Witnesses
Wm. E. Dyer.
D. Darby.

Inventor
William W. Worthington
by F. W. Ritter
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM W. WORTHINGTON, OF CALDWELL, NEW JERSEY, ASSIGNOR TO THE Q. & C. COMPANY, OF CHICAGO, ILLINOIS.

METHOD OF MAKING RAILROAD TIE-PLATES.

SPECIFICATION forming part of Letters Patent No. 506,963, dated October 17, 1893.

Application filed November 1, 1892. Serial No. 450,680. (No specimens.)

To all whom it may concern:

Be it known that I, WILLIAM W. WORTHINGTON, a citizen of the United States, residing at Caldwell, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Methods of Making Railroad Tie-Plates; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, wherein—

Figure 1, is a view of a portion of a rail and tie, and an end view of a tie plate in position. Fig. 2, is a perspective view of a tie-plate. Fig. 3, is a perspective view of a portion of a bar adapted for making tie-plates, and Fig. 4, is a view of portions of a pair of rolls having passes adapted to produce tie-plate bar.

Like symbols refer to like parts wherever they occur.

My invention relates to the method of making what are termed "tie-plates" or wear-plates for railway ties, such as are used in track laying to prevent the vibration of the rail breaking the fiber of the tie, which when it occurs leads to water soaking, decay, and rapid destruction of the tie. Such tie plates, as is now well understood, should be sufficiently light to preserve the flexibility of the tie and avoid hammering, and yet sufficiently strong to avoid bending or buckling at the margin of the foot flange of the rail, and to meet these requirements the plates are preferably formed with longitudinal ribs or projections on the under surface which brace the plate transversely of the rail and enter the tie in line with the fiber thereof so as to avoid injury to the tie. Furthermore, such tie plates should be provided with a series of lugs or projections upon their upper surface to brace the foot flange of the rail, prevent its lateral movement on the tie plate and relieve the spikes from drawing strains.

The object of my invention is the economical production of tie-plates having the general construction, or characteristics hereinbefore specified.

To this end the invention generally stated consists in first forming a tie-plate or bar constituting a series of tie plates, with a longitudinal rib or ribs on one face, and parallel longitudinal ribs on the opposite face, and then planing or cutting away sections of the parallel ribs to form a seat and abutments for the foot flange of a rail, all as will hereinafter more fully appear.

I will now proceed to describe my invention more fully so that others skilled in the art to which it appertains may apply the same.

In the drawings A, indicates the railway tie, B the rail, and C an interposed tie plate.

The tie-plate C, will have upon its under surface one or more longitudinal ribs 1, 1, which when the tie-plate is in position extend in the line of the fiber of the tie, transversely of the rail, and are of sufficient length to form a truss beneath the foot flange of rail B, and prevent the buckling or bending of the tie plate. Upon the upper surface of said tie plate is also a series of longitudinally arranged ribs or projections 2, 2, and so disposed as to border on the rail seat 3, and form abutments for the foot flange B' of the rail—to resist the lateral movement of rail B on the tie plate C, and prevent any drawing strain on the spikes which secure the rail.

To economically produce a tie plate of the character shown, I first produce a tie-plate bar of the general form shown in Fig. 3—that is to say with a series of longitudinal ribs upon both faces—which can be conveniently accomplished by means of rolls having two or more passes—as at *a*, *b*, Fig. 4—and subsequently remove sections 2^c of the ribs upon one face of the plate, to form the rail seat 3—by transversely planing the plate.

It is evident that tie-plates having the characteristics specified can thus be formed singly in an expeditious and economic manner, but that for purposes of manufacture it will be desirable to form the tie plate bar in multiples of the tie plate, and subsequently sever the single tie plates therefrom.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

The method herein described for making railway tie-plates, which consists in first form-

ing the plate with longitudinal ribs on both of its faces, and then planing or cutting away parallel sections of the ribs upon one face of the plate to form the seat and abutments for the foot flange of the rail; substantially as and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 26th day October, 1892.

WILLIAM W. WORTHINGTON

Witnesses:
WILLIAM L. FINDLEY,
LOUISE A. BERNARD.

887 & 1888 EXHIBIT S28.

KATE S. HOLMES,
Notary Public.

(No Model.)

J. CHURCHWARD.

WEAR PLATE.

No. 508,086. Patented Nov. 7, 1893.

Fig. 2.

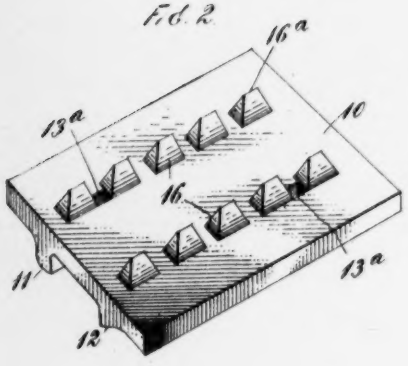


Fig. 3.

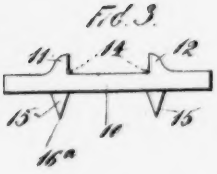


Fig. 1.

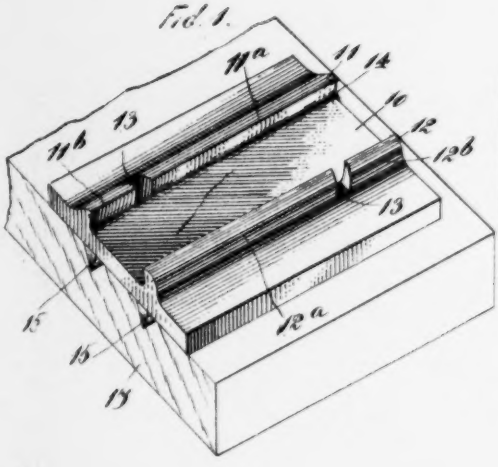
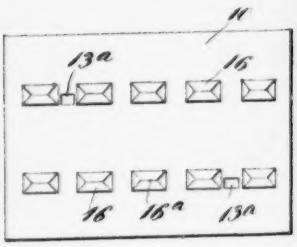


Fig. 4.



Witnesses:
John Buckler.
Percy J. Griffiths.

James Churchward
Inventor
By Field & Co.
Attorneys

UNITED STATES PATENT OFFICE.

JAMES CHURCHWARD, OF BROOKLYN, NEW YORK.

WEAR-PLATE

SPECIFICATION forming part of Letters Patent No. 508,086, dated November 7, 1893.

Application filed February 20, 1893. Serial No. 462,976. (No model.)

To all whom it may concern:

Be it known that I, JAMES CHURCHWARD, a subject of the Queen of England, and a resident of the city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Wear-Plates, of which the following is a specification.

My invention relates to railway appliances, and its object is to provide a plate to intervene the usual wooden tie and the rail, which will counteract any tendency of the rail to "creep" longitudinally or spread longitudinally particularly on curves, and which will prevent wear of the rail on the tie and otherwise conduce to its longevity.

The invention consists of a wear plate constructed as hereinafter described and claimed.

The accompanying drawings forming a part of this specification illustrate the invention, similar numerals of reference thereon indicating corresponding parts in the several views.

Figure 1 is a perspective view of a wear plate constructed in accordance with my invention, the tie appearing in dotted lines. Fig. 2 is an inverted perspective view of the plate. Fig. 3 is an end view of the same; and Fig. 4 is an inverted plan view.

In carrying my invention into effect, I construct the wear plate of metal, either iron or steel, in rectangular shape, and of any suitable and desired dimensions. The body of the plate 10, has formed upon its upper face preferably at points equidistant from its ends, two transversely-ranging parallel shoulders 11 and 12, each of which is divided transversely and at points diagonally opposite each other by a recess 13, in the base of which recess is formed a through aperture 13^a to receive a spike, the recess 13, as will appear by referring to Fig. 1 dividing the shoulders 11 and 12 into long sections 11^a and 12^a and short sections 11^b and 12^b. At the point of junction of the inner faces of the shoulders and the upper face of the plate, a fillet 14 is embedded by any suitable metal rolling machine. Said fillet is so introduced in order to strengthen the junction of the shoulders and plate and prevent fracture, and the faces of the fillets are concaved to correspond with the convexity of the edges of the base flange of the rail. On the under face of the plate 10 and in vertical alignment with the shoulders 11 and 12, are formed one or more parallel ribs 15, comprising a series of divisions 16, five being shown in the drawings in each series, but their number may be increased if found desirable in practice. These divisions 16 are beveled equally on all their sides, and form a cutting edge 16^a and embrace near the ends of the series the spike apertures 13^a, as shown in Figs. 2 and 4. The divisions 16 of one rib may or may not be in transverse alignment as found desirable. In applying the wear plate, it is placed upon the tie 17, with its shoulders 11 and 12, and ribs 15, extending transversely of the tie and across the grain of the wood, the divisions 16 of the ribs 15 are forced into the tie until the plate body rests snugly thereon, the rail is inserted between the shoulders 11 and 12 and spikes are driven through the plate into the tie, thus binding the rail, plate and tie firmly together.

The advantage of the form of the ribs 15 as herein shown and described over a continuous and unbroken sharp flange having square ends, is, that such flange in making a cut in the tie at a right angle with the plate, leaves an opening or check at its ends and affords a receptacle for water, and the water which is invariably drawn between the plate and tie by capillary attraction, passes to the center of the tie and causes rot; whereas the divisions 17 of the ribs 15, as they cut their way into and across the grain of the tie, plug or cork up the holes they make and compress the wood all around themselves, so that the water cannot percolate to the center of the tie, and rot and decay of the tie are prevented.

A further advantage of the form of rib herein shown, is that the divisions of the rib are so tapered that on entering the tie they compress the timber and virtually form a band on the upper surface of the tie, thus preventing the same from cracking or splitting. The importance of this may be understood from the fact that it is quite common to find railroad ties, in track, which have gaping cracks of an inch or more diameter, caused by the heat of the sun's rays drying out the sap. While this splitting and cracking may be prevented by the use of a wear-plate provided with the divided rib, it is apparent that

a plate having a continuous rib would not effect the same result.

By providing the wear plate with two parallel shoulders on its upper face, it is of especial advantage upon curves of a railway track. As for instance, where the curve is elevated for a fast train, the wheels of the train act to push the rail against the outer rib, the latter counteracting lateral spreading of the rail in that direction and protecting the spike. When a slow train takes the curve, its wheels meet with too great an elevation, and consequently hug inward and have a tendency to draw the rail with them, and in this event the inner rib counteracts displacement of the rail and also prevents abrasion of the spike.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. A wear plate for railways formed on its upper face with one or more transversely ranging divided shoulders, and on its under face with one or more transversely ranging divided ribs, substantially as shown and described.

2. A wear plate for railways, formed on its upper face with one or more transversely ranging shoulders comprising a short section and a long section, and formed on its under face with one or more transversely-ranging divided ribs, substantially as shown and described.

3. A wear plate for railways formed on its under face with one or more transversely ranging knife-edged ribs, divided into a series of short sections rectangular in cross section, and beveled on all their sides, substantially as shown and described.

4. A wear plate for railways formed on its under face with one or more transversely ranging knife-edged ribs, divided into a series of short sections rectangular in cross section, beveled on all their sides, and elongated longitudinally to the direction of the rails above the plate, substantially as shown and described.

5. A wear plate for railways formed on its under face with one or more transversely ranging knife-edged ribs, divided into a series of short sections beveled on all their sides, the end divisions of the said ribs being situated within the edges of the said plate, substantially as shown and described.

6. A wear plate for railways formed on its under face with two transversely ranging parallel knife-edged ribs each divided into a series of short sections beveled on all their sides, substantially as shown and described.

7. A wear plate for railways, formed on its upper face with one or more shoulders, and on its under face with two transversely ranging parallel knife-edged ribs, each divided into a series of short sections beveled on all their sides, substantially as shown and described.

8. A wear plate for railways formed on its upper face with one or more transversely-ranging divided shoulders, and on its under face with one or more transversely-ranging ribs comprising a series of divisions beveled on all sides to form a cutting edge, substantially as shown and described.

9. A wear plate for railways formed on its upper face with one or more transversely-ranging shoulders, comprising a long section and a short section, and formed on its under face with one or more transversely-ranging ribs, comprising a series of divisions beveled on all sides to form a knife edge, substantially as shown and described.

10. A wear plate for railways formed on its under face with one or more transversely-ranging ribs and on its upper face with one or more transversely-ranging shoulders, with diagonally opposite spike-holes extending through the plate and one or more of the said shoulders, substantially as shown and described.

11. A wear plate for railways, formed on its under face with one or more transversely-ranging ribs, comprising a series of divisions and on its upper face with one or more transversely-ranging shoulders, with diagonally-opposite spike-holes extending through the plate and one or more of the said shoulders, substantially as shown and described.

12. A wear plate for railways formed on its under face with one or more transversely-ranging divided ribs, and on its upper face with one or more transversely-ranging shoulders with diagonally-opposite spike-holes extending through both the said shoulders and the ribs, substantially as shown and described.

13. A wear plate for railways, consisting of a flat body having two transversely-ranging parallel shoulders on its upper face, each formed of a long section and a short section and having on its under face one or more transversely-ranging ribs, comprising a series of divisions beveled equally on all its sides, substantially as shown and described.

14. A wear plate for railways, consisting of a flat body, two transversly ranging parallel shoulders on the upper face of said body, each formed of a long section and a short section, a fillet at the junction of the inner faces of said shoulders and the body of the plate, and one or more transversely-ranging ribs on the under face of said body, comprising a series of divisions beveled equally on all sides, producing a cutting edge, spike apertures intersecting the shoulders and ribs, substantially as shown and described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 16th day of February, 1893.

JAMES CHURCHWARD.

Witnesses:
M. A. CASSIDY,
M. V. CRONIN.

1893 & 1894 EXHIBIT S29.

KATE S. HOLMES,
Notary Public.

1211

(No Model.)

W. W. HOLMES.

RAILWAY TIE PLATE.

No. 514,465. Patented Feb. 13, 1894.

Fig. 1.

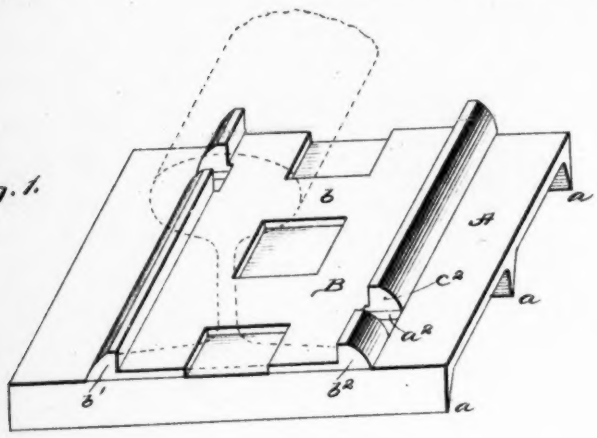


Fig. 2

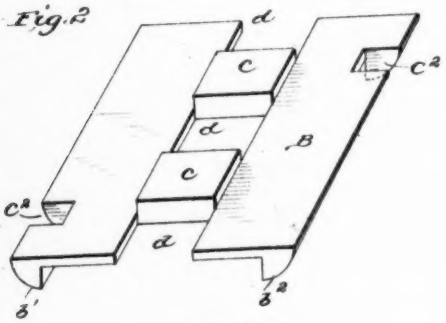
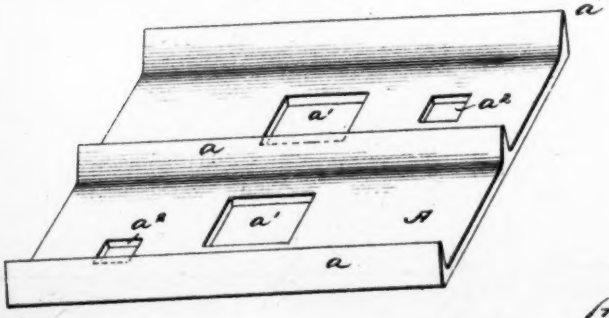


Fig. 3.



Witnesses:

Harry E. Ashton

Wm. E. Doyle

Inventor

William W. Holmes

By F. W. Rille

UNITED STATES PATENT OFFICE.

WILLIAM W. HOLMES, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE SERVIS RAILROAD TIE PLATE COMPANY.

RAILWAY-TIE PLATE.

SPECIFICATION forming part of Letters Patent No. 514,465, dated February 13, 1894.

Application filed June 2, 1893. Serial No. 476,367. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. HOLMES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Railway-Tie Plates; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of a compound tie-plate, embodying my invention, the dotted lines indicating the position of the rail when in service. Fig. 2 is a bottom perspective view of the upper or rail plate, and Fig. 3 is a bottom perspective view of the lower or bed-plate.

Like symbols refer to like parts wherever they occur.

My invention relates to the construction of that class of devices commonly termed wear-plates or tie-plates, which are interposed between the rail and the tie to protect the tie from rapid destruction and prevent any lateral movement of the rail; and has for its object the production of a simple, efficient, cheap, and easily manufactured trussed tie-plate, provided with lateral supports or abutments for the foot flange of the rail.

To this end the invention, generally stated, consists in the combination with a trussed base plate or tie-plate proper, of a superposed rail-plate provided with abutments for the foot flange of the rail.

There are other, minor, features of invention relating to the particular means for combining the plates, all as will hereinafter more fully appear.

In railway tie-plates of the general character to which this invention belongs, the rib or truss flanges on the under side of the plate are preferably arranged parallel with the fiber of the tie and transversely of the rail, so as to prevent the buckling of the tie-plate, as well as to avoid rupture of the fiber of the tie, while the abutments on the upper side of the tie-plate for the lateral support of the foot flange of the rail, are at right angles to the truss ribs or flanges on the under side of the plate. As a consequence of this, single part tie-plates of the usual forms, are as a general rule, necessarily produced by casting. In case of my compound tie-plate it may be produced by either casting or rolling—and as rolling produces the lighter, strongest, and most elastic or resilient plate—such method of production is to be preferred, though the invention is not limited thereto.

I will now proceed to describe my invention more fully, so that others skilled in the art to which it appertains may apply the same.

In the drawings A indicates the base-plate, and B the rail-plate of a compound tie-plate.

The base-plate A has upon its under face one or more—preferably a series of ribs or flanges *a*, adapted to enter the railway tie parallel with the fiber thereof so as not to tear or destroy the fiber—which ribs serve not only to truss or strengthen the plate and prevent its buckling under the tread of the loaded wheel, but also to prevent the creeping or moving of the tie-plate on the tie. About midlength of the base-plate it is provided with one or more perforations a'—preferably a series, and of polygonal shape—to receive a projection or projections on the under face of the superposed rail-plate B, and said base-plate A may also be provided with one or more spike holes a^2.

The superposed rail plate B is preferably provided with a series of three or more projections or ribs, of which the two on its upper surface are parallel and bound the rail seat *b* forming the lateral abutments b' and b^2, for the foot flange of the rail (shown in dotted line) while that upon its under surface lies midway between and is cut away at points to form the projection (or projections) *c*, which enters the perforation a' of the base plate A. Rail-plate B, as shown in the drawings, is also perforated, as at c^2, in line with perforation a^3 of base plate A for the passage of the spike.

In making my compound tie-plate I prefer to roll two bars the first of which shall be a multiple of base plate A having one or more longitudinal ribs *a*, and the second of which shall be a multiple of rail plate B having longitudinal ribs, two upon its upper surface corresponding to the abutments b' b^2, and one upon its under surface corresponding to projection *c*. Such bars are then cut into proper lengths for tie-plates, and the sections for the

base-plate A are punched as at a' a^2, while those for the rail plate are punched as at c^2 for the spike, and as at d, d, d, to remove such portions of the central rib as are not required for the projections c which enter the perforations a' of the base plate A. The separate sections A B, can thus be produced by rolling as well as by casting and will, when placed in position one upon the other, produce a compound tie-plate wherein the truss ribs of the base plate and the abutments of the rail plate for the foot flange of the rail are at right angles, the position required to best support the plate and prevent the buckling thereof and prevent the lateral displacement of the rail.

It will be at once evident to one skilled in the art, that the projections (c) may be made on the upper surface of the base plate A, and the corresponding opening (a'), by which the plates lock, in the rail-plate B; and it will also be evident to such persons, that by a proper arrangement of the spike openings a^2, c^2 of the two plates the openings a' and the projections c' may be omitted; and having herein shown and described the best mode known to me of carrying out my invention, I include the above alternative, and all equivalent constructions in the following claims.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination in a tie-plate, of a base-plate having one or more ribs or flanges on its under face, and a superposed rail plate having abutments for the rail flange; substantially as and for the purposes specified.

2. The combination in a tie-plate, of a base-plate and a superposed rail-plate, both of said plates having ribs or flanges, the ribs on one plate being at an angle to those on the other, one of said plates having an orifice adapted to receive a rib or projection on the other plate; substantially as and for the purposes specified.

3. A compound tie-plate, composed of a base-plate having one or more longitudinal ribs or flanges a and a series of slots a', and a superposed rail plate having rail abutments b' b^2, and projections c' substantially as and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 25th day of May, 1893.

WILLIAM W. HOLMES.

Witnesses:
S. E. RUSSELL,
JNO. W. CARRINGTON, Jr.

99 & 1900 EXHIBIT S30.

KATE S. HOLMES,
Notary Public.

1215

(No Model.)

W. W. HOLMES.

RAILWAY TIE PLATE.

No. 514,466. Patented Feb. 13, 1894.

Fig. 1.

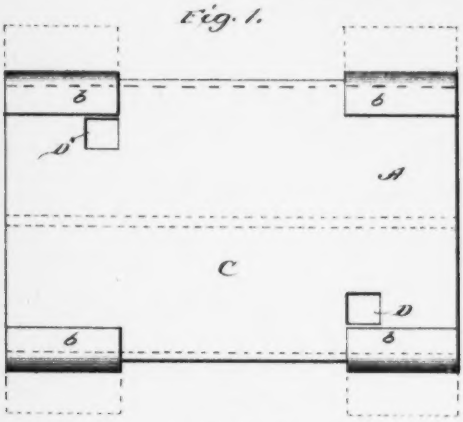


Fig. 2.

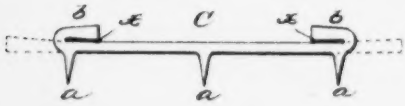


Fig. 3.

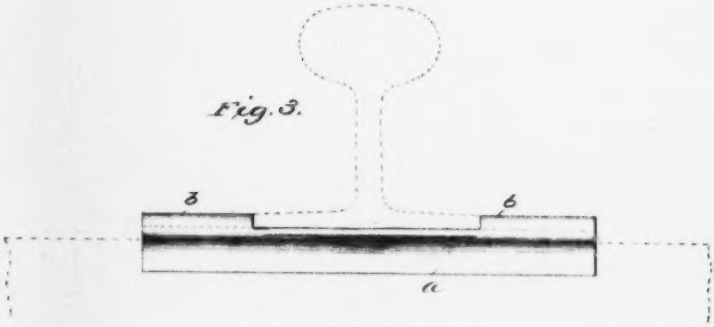
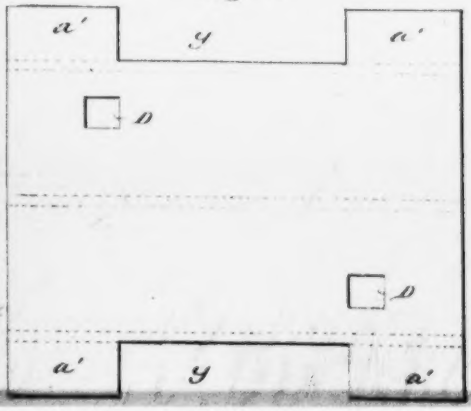


Fig. 4.



Witnesses:
Harry S. Ashur
M. E. Dyer

Inventor:
William W. Holmes
By F. W. Ritter
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM W. HOLMES, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE SERVIS RAILROAD TIE PLATE COMPANY.

RAILWAY-TIE PLATE.

SPECIFICATION forming part of Letters Patent No. 514,466, dated February 13, 1894.

Application filed June 2, 1893. Serial No. 476,368. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. HOLMES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Railway-Tie Plates and Methods of Making the Same; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a plan or face view of a railway tie-plate embodying my invention. Fig. 2 is an end view of said railway tie-plate. Fig. 3 is a side elevation of said railway tie-plate; and Fig. 4 is a plan view of the blank before the projecting uncut edges have been folded over to form the abutments for the rail flange.

In Figs. 1 and 2 the dotted lines indicate the position of certain portions of the metal at different stages of the manufacture, while in Fig. 3, the dotted lines indicate the relation of the railway tie and rail to the tie-plate when in use.

Like symbols refer to like parts wherever they occur.

My invention relates to the construction and manner of making that class of railway tie-plates, or wear-plates, wherein the plate is provided with one or more truss or strengthening ribs on its under or tie face, and a series of projections or abutments on its rail face, and has for its object to simplify the form of the plate so that it can be readily and rapidly manufactured. It is now well understood that for this class of articles rolled metal is preferable to cast metal, because lightness with flexibility is thus obtained whereby the resiliency of the railway-tie is utilized and hammering of the rail by the passing loaded wheel is avoided. But in such tie-plates truss ribs are necessary on the under surface to stiffen the plate and prevent buckling, while on the upper surface abutments are desirable to prevent lateral movement of the rail, consequently such tie-plates, in their more common forms, require to be either cast or drop forged.

In carrying out my invention I first roll a plate (or a multiple plate bar) with one or more longitudinal ribs on one face thereof, and then cut a tongue or tongues from the body of the metal plate and fold the same on the opposite face of the metal plate to form abutments for the foot flange of the rail—which method of manufacture embraces the first feature of my invention. By said method or its equivalent I obtain a metal tie-plate having a longitudinal truss rib or ribs upon one face, and on the opposite face folds of the body metal which constitute abutments for the foot flange of a rail—which construction embraces the second feature of my invention.

I will now proceed to describe my invention more fully, so that others skilled in the art to which it appertains may apply the same.

In the drawings A indicates a tie-plate having on its under surface one or more longitudinal ribs *a*, and upon its upper surface a series of abutments *b* which latter bound the seat C for the rail base and are formed by the folded edges of the plate A.

D indicates spike holes for securing the rail and plate to the tie. In forming said plate I first roll a plate—or a bar composing a number of plates—with one or more longitudinal ribs or flanges *a* upon one face thereof; and if a series of said longitudinal ribs are formed they are preferably parallel with the outer edge of the plate and the outer ones are some distance within the margins or side edges of the plate or bar, as indicated by the dotted lines Fig. 2, which project in the plane of the plate. Furthermore, while said projecting portions (shown in dotted line) may be of even gage with the body of the plate, they are preferably thickened up a gage or two so as to bear on the face of plate A when folded as indicated at *x* Fig. 3.

Having obtained a plate of the character specified, I then cut away from the side edges thereof sections equal in length to the width of the rail base—as indicated at *y y*—leaving the tongues or pieces *a'* projecting laterally, which tongues are thereafter folded down upon the face of the plate A, and the ends thereof bound the seat for the foot flange of the rail forming the abutments which prevent any lateral movement of the rail when in po-

sition as indicated by dotted lines Fig. 3. I thus obtain in an expeditious and economical manner, with little labor or loss of material, a light, stiff, and resilient tie-plate having truss ribs and rail flange abutments and fulfilling all the requirements of this class of tie-plates.

I have herein pointed out what I deem to be the best form of plate, and manner of producing the foot flange abutments, which border the rail seat on the upper face of the plate, but it will be evident to the skilled mechanic, that the folding tongues or pieces a' may be obtained by simply cutting the plate without removing the section $y—y$; or that the folding tongue a' may be cut from the body of the plate within the margin thereof without departing from the spirit or scope of my invention. I do not, however, recommend cutting the folding tongue in the body of the plate, as it has a tendency to reduce the strength of the plate and lead to its buckling.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The method herein described for making railway tie-plates, which consists in first forming a plate or bar with a longitudinal rib or ribs upon one face thereof, and then forming abutments on the opposite face of the plate by folding a section or sections of the plate upon itself; substantially as and for the purposes specified.

2. A railway tie-plate having on one face a longitudinal truss rib, and on the opposite face folds of the body metal which form abutments for the foot flange of a rail; substantially as and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 25th day of May, 1893.

WILLIAM W. HOLMES.

Witnesses:
JNO. W. CARRINGTON, JR.,
S. E. RUSSELL.

1905 & 1906

EXHIBIT S31.

KATE S. HOLMES,
Notary Public.

1219

(No Model.)

W. W. HOLMES.

RAILWAY TIE PLATE AND METHOD OF MAKING SAME.

No. 514,467. Patented Feb. 13, 1894.

Fig. 1.

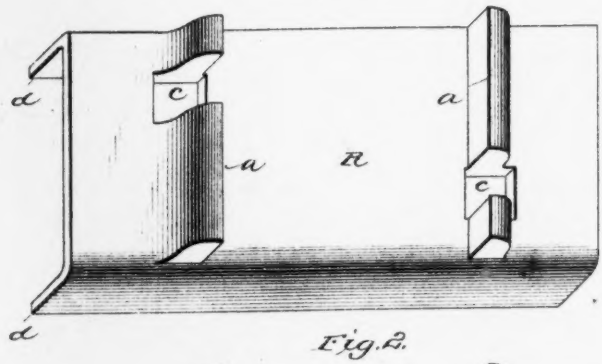


Fig. 2.

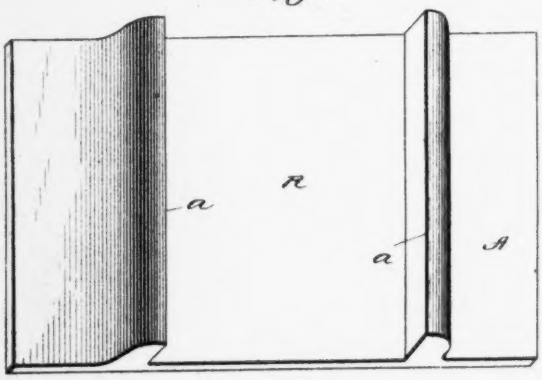
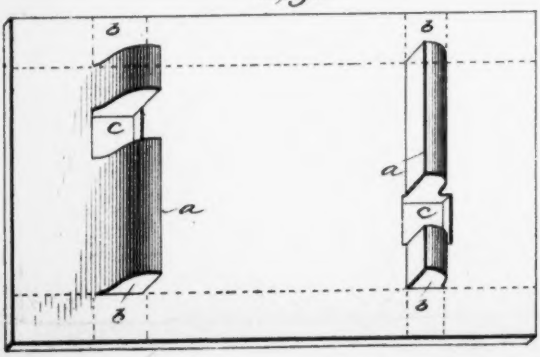


Fig. 3.



Witnesses:

Harry D. Asher

Wm. E. Dyer

Inventor:

William W. Holmes

By F. W. Ritter Jr.

Atty.

UNITED STATES PATENT OFFICE.

ILLIAM W. HOLMES, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE SERVIS RAILROAD TIE PLATE COMPANY.

RAILWAY-TIE PLATE AND METHOD OF MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 514,467, dated February 13, 1894.

Application filed June 2, 1893. Serial No. 476,369. (No model.)

o all whom it may concern:

Be it known that I, WILLIAM W. HOLMES, citizen of the United States, residing at Chigo, in the county of Cook and State of Illiis, have invented certain new and useful nprovements in Railway-Tie Plates and ethods of Making the Same; and I hereby eclare the following to be a full, clear, and act description of the same, reference being ad to the accompanying drawings, in which—

Figure 1 is a perspective view of a railway e-plate embodying my invention. Fig. 2 is perspective view of a blank for forming the e-plate as produced by the first step in the ethod of manufacture, and Fig. 3 is a perective view of the blank after the second nd before the final step of manufacture.

Like symbols refer to like parts wherever ey occur.

The object of my invention is the cheap nd rapid production of an efficient wrought etal tie-plate having on one face ribs or anges which are adapted to enter a railway- e parallel with the fiber thereof, and on the pposite face ribs or abutments at right anles to the first named ribs or flanges and dapted to form abutments for the foot flange f a rail.

Wear-plates, or tie-plates which are inended for general use in laying railway acks, and are intended to be interposed beween the base of the rail and the tie to preent the rapid destruction of the tie, must ecessarily be of a character which will preent the lateral movement of the rail on the ie-plate and the tie-plate on the tie, and this ithout loss of strength, lightness and resiliency in the plate, to avoid hammering and uckling, and without destruction of the fiber f the tie which would induce the water soakng and rotting of the tie as well as reduce the hold of the plate on the tie. To meet these requirements in railway tie-plates—or wear-plates, longitudinal ribs or truss flanges been formed on the bottom of the tie-ate and projections or abutments on the op or upper face of the plate, and the comon methods of producing such plates have been by casting or forging which in one case reduced the resiliency and added to the weight of the plate, and in the other increased unduly the cost of manufacture. To overcome these several objections, I produce a wrought metal bar (preferably rolled steel) having on one of its faces parallel ribs to form abutments for the foot flanges of a rail, which ribs are thereafter cut back at the ends a distance equal to the width of rib or flange required on the opposite face, and finally bend the plate at right angles to the ribs to form ribs on the tie-face of the wear-plate—which method or its equivalent embraces the first feature of my invention. By said method of procedure, I obtain a wear-plate or tie plate of wrought metal having upon its rail-face continuous parallel ribs or abutments, and on its opposite face or tie-face parallel and continuous flanges or ribs at right angles to the first named ribs—and such tie-plate embraces the second feature of my invention.

I will now proceed to describe my invention more fully, so that others skilled in the art to which it appertains may apply the same.

In the drawings A indicates a section of suitable width for a tie-plate which has been cut from a rolled bar of the same general form (a multiple tie-plate bar) having longitudinal ribs *a a* parallel with each other, and sufficiently far apart to accommodate a rail base and form a rail seat R. The width of the bar from which said section A is cut, will be equal to the required length of the tie-plate.

The next step in the process of forming the tie-plate consists in cutting off the ends of ribs *a*, *a*, as at *b*, *b*, so as to expose the plate for a distance equal to the width of the flange required on the opposite face of the plate, and at this time, or subsequently—the spike openings *c c* may be punched, which will leave the blank in the condition shown in Fig. 3. It is perfectly practicable to punch the spike holes *c c* and remove the ends of the ribs *a*, *a*, by punches or dies at a single operation but in such case the metal in the plate would be cut out as indicated at dotted lines Fig. 3—and this is not desirable as it would remove the truss flanges from the plate at the points of greatest strain, and render the plate more liable to bend or buckle.

Having obtained the blank in the form

1221

shown in Fig. 3, its parallel side edges are then bent up at right angles to the bottom face of the plate to form the truss ribs or flanges *d d* on the under side of the plate—thus obtaining a wrought metal tie-plate having on one face parallel abutments for the base of a rail, and on its opposite face and at right angles to the first named abutments or ribs—a second set of flanges or ribs adapted to enter the tie parallel with the fiber of the tie—or in other words—a tie-plate of the general character shown in Fig. 1.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The method herein described for forming tie-plates which consists in first producing a metal plate having on one face parallel ribs, second removing the ends of said ribs for a distance equal to the width of the required flanges on the opposite face of the plate, and finally bending the edges of the plate at right angles to the body of the plate and also at right angles to the first named ribs; substantially as and for the purposes specified.

2. A tie-plate having on its rail face parallel ribs, and on its tie-face parallel ribs at right angles to the ribs on its rail face; substantially as and for the purposes specified.

In testimony whereof I affix my signature in presence of two witnesses, this 25th day of May, 1893.

WILLIAM W. HOLMES.

Witnesses:
JNO. W. CARRINGTON, Jr.,
S. E. RUSSELL.

911 & 1912 EXHIBIT S32.

KATE S. HOLMES,
Notary Public.

1223

(No Model.) 2 Sheets—Sheet 1.

J. A. HARRIS.

TIE PLATE FOR RAILWAY TRACKS.

No. 514,828. Patented Feb. 13, 1894.

Fig. 1.

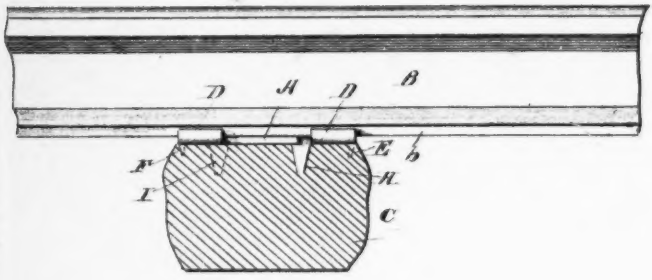


Fig. 2.

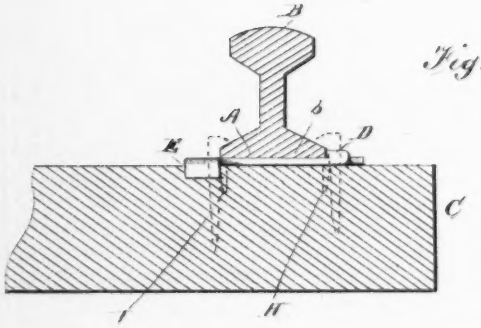
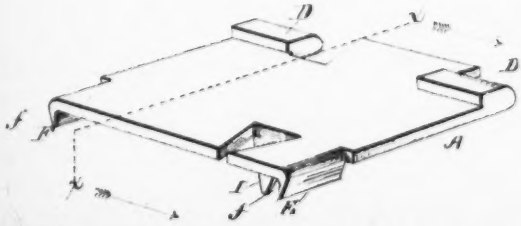


Fig. 3.



WITNESSES:
W. H. H. Knight
Arthur L. Bryant

INVENTOR
Joseph A. Harris
BY
Joseph A. Edson
ATTORNEY.

1224

(No Model.) 2 Sheets—Sheet 2.

J. A. HARRIS.

TIE PLATE FOR RAILWAY TRACKS.

No. 514,828. Patented Feb. 13, 1894.

Fig. 4.

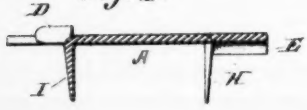


Fig. 5.

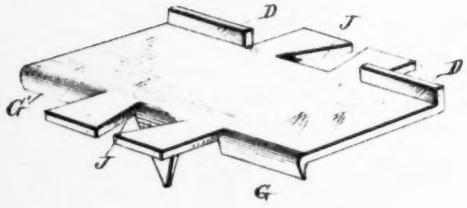
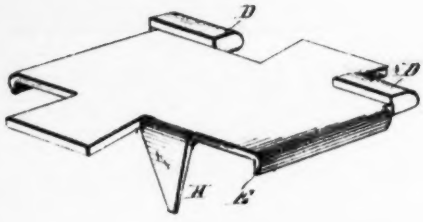


Fig. 6.



WITNESSES:
W. H. H. Knight
Arthur L. Bryant

INVENTOR
Joseph A. Harris
BY
Joseph R. Edson
ATTORNEY.

UNITED STATES PATENT OFFICE.

JOSEPH A. HARRIS, OF MONCTON, CANADA.

TIE-PLATE FOR RAILWAY-TRACKS.

SPECIFICATION forming part of Letters Patent No. 514,828, dated February 13, 1894.

Application filed December 29, 1892. Serial No. 456,731. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH A. HARRIS, residing at the city of Moncton, Province of New Brunswick, Canada, have invented certain new and useful Improvements in Tie-Plates for Railway-Tracks, of which the following is a full, clear, and exact specification.

The present invention relates to improvements in tie plates for railway tracks designed to afford a firm bearing for the base of the rail upon a soft wooden tie, thus combining the cheapness and elasticity of a soft-wood tie with all the stability and wearing qualities of a hard wood or metallic tie, although the improvements can be advantageously used on a hard wood tie; but its prime economy and efficiency is greater and more apparent in connection with a soft wood tie which costs far less than the expensive hard wood ties, such as locust or oak ties, now generally used.

The primary object of this improvement is to obviate the wearing and grinding action of the rail upon the ties and the holding spikes due to the impact and weight upon the head of the rail of the heavily loaded rolling stock; and at the same time hold the rail firmly on its bed, in a correct upright position, to afford a good bearing for the wheels and flanges, and prevent the rails from spreading, thus reducing to a minimum the liability to derailment of the train consequent upon the "spreading" or lateral displacement of the rails which is not infrequently caused by the tie being worn away and the spikes being loosened by the grinding or abrasive action of the rail on the tie and spikes when the latter rest directly upon the tie or are driven into direct contact with the fibers of the wood without being protected.

With these and such other ends in view as pertain to my invention, it consists of a tie plate adapted to be interposed between the tie and base of a rail and to afford a broad firm bearing for the base of the rail, said plate provided with depending spike-guards or prongs having cutting edges designed to penetrate the tie, and arranged substantially as will be hereinafter more fully set forth, to contact with the inner face of the spike when it is driven; said tie-plate being further provided with depending retainer flanges, and with a rib or flange on its upper side designed to bear against the foot of the rail which is seated on my improved tie-plate when the device is in use. The spike-flanges and guards are stamped or cut from the body of the plate, and turned downward therefrom, so as to enter the wooden-tie in line with the grain of the wood, and the spike is driven into the tie so that its upper part is in contact with or bears against one face of the spike guard or prong while its head bears directly on the upper side of the base of the rail, whereby the spikes are protected, by said prongs or flanges, from being loosened in the tie by the grinding or abrasive action of the rail thereon when the rolling stock passes over and upon the head of the rail.

The depending retainer-flanges may be provided along the side edges of the tie or bearing plate, so as to be driven into the wooden tie in line with the grain of the wood, to afford in conjunction with the spike guards or prongs and the spikes themselves a very secure means for fastening the tie or bearing plate to the wooden tie; but said retainer-flanges may be arranged across the ends of the tie-plate, or additional flanges may be used across the ends of the tie-plate in conjunction with the side-retainer flanges, and designed to be driven into the wooden tie across the grain thereof, to more effectually prevent endwise as well as lateral displacement of said tie or bearing plate upon the tie.

The rail-flange on the upper side of the tie or bearing plate acts in connection with the depending retainer-flanges to prevent edgewise displacement of the tie-plate beneath the rail; and a better distribution of bearing surface for the rail is afforded by said tie-plate as the retainer-flanges and rail flange combine to give great strength and stiffness so that under ordinary or even excessive load or pressure of the rolling stock, the plate will not yield or break under the rail. The spike-guards or prongs are arranged, preferably, at diagonally opposite corners of the plate, and the spikes act together against the guards or prongs so as to greatly overcome the tendency of the rails to slip or move.

The depending retainer flanges and spike guards or prongs together with the rail flanges on the upper side of the plate, tend to add

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greatly to the rigidity and strength of the plate, or to reinforce the same; and as said tie or bearing plate receives all the wear and abrasive action of the rail in all its actions and movements, and is so firmly held to the wood that the rail cannot become displaced, a structure is produced which supplies all the wearing and durable qualities of a metallic or hard wood tie with the elasticity and cheapness of the soft wood tie.

The preferred embodiment of my invention, as well as modifications thereof, are illustrated by the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a view showing the rail in side elevation, the tie in cross section, and the tie or rail-bearing plate in end view. Fig. 2 is a view at right angles to Fig. 1 illustrating the rail in transverse section, the tie in longitudinal section, and the side edge of the bearing plate. Fig. 3 is a perspective view of the preferred embodiment of my tie plate, and Fig. 4 is a transverse section thereof, on the plane indicated by the dotted line x—x of Fig. 3. Fig. 5 is a perspective view of one modification of my tie-plate, and Fig. 6 is a like view of another modified construction of my tie-plate.

I will now proceed to a detailed description of the preferred embodiments of my invention, in connection with said drawings, in which like letters of reference denote like parts in all the figures.

Referring now to the drawings, and more particularly to Figs. 1 to 4 inclusive, A is the tie or bearing plate which is interposed between the base b of the rail B and the wooden tie C. The tie or bearing plate is preferably of the general rectangular flat form shown in the drawings, and it is placed squarely down on the tie with its length in the direction of the rail and at right angles across the tie so that the base of the rail bears firmly on the tie-plate. Said plate is formed of a single piece of metal, by rolling it to the required thickness, and at this operation of rolling the plate the rail-flange D is formed at or near one of the side-edges of said plate A. This integral rail-flange D projects sufficiently above the upper side of the plate to have firm bearing against the side of the base of the rail, and said rail-flange may run continuously from end to end of the tie or bearing plate or it may be intersected, or be made discontinuous, by punching the plate to form one of the depending spike prongs or guards.

At the end of the tie or bearing plate A, I provide the depending retainer flange E, or two retainer flanges E, F, may be formed at opposite ends of said plate. These retainer flanges E, F, lie at right angles to the line or body of the tie-plate, and they are preferably tapered from their juncture with the plate toward the lower edges thereof, indicated at f, to adapt said flanges to readily penetrate the fibers of the wood-tie and still have a firm hold thereon. In the preferred embodiment of my invention, I make the tie-plate with two retainer-flanges, one at each end thereof, and arranged so as to be driven into the tie in line with the fibers of the wood as shown by Figs. 1 and 2, but I would have it understood that my invention is not restricted to this particular arrangement of the retainer-flanges provided along one of its side edges, as shown by Fig. 5 at G, G′, said side retainer flanges being designed to penetrate the wood at right angles to the grain thereof and which assist, in connection with the spikes and the spike-prongs or guards, to hold the tie-plate firmly on the tie against edgewise displacement laterally to the line of the rail.

H, I, are the spike prongs or guards which are made integral with the plate A and depend therefrom, at right angles to the line or body of the same. These spike prongs or guards are arranged to enter the tie at right angles to or across the grain of the wood, and in the preferred form of plate the prongs or guards are arranged so that the edges thereof are presented to the faces of the retainer-flanges. These prongs or guards are preferably located near diagonally opposite corners of the plate; and in the plate shown by Figs. 3 and 4, the flange H is formed by making an incision along the edge of the plate and then bending down a part of the metal along this incision while the prong I on the opposite side of the plate is formed by making a triangular punch in the edge of the plate, between the ends of the rail-flange, and then similarly bending the metal so punched. These spike flanges are of the triangular form shown in the drawings and after the plate has been placed in position on the rail it is forced downward so that the retainer flanges and spike prongs penetrate the fibers of the wooden tie.

The rail having been placed on the tie-plate so that its base rests firmly thereon, the spikes are driven into the tie, with their heads resting on the base of the rail and the upper part of each spike rests against and in contact with the prong or guard, thereby holding the rail in position and the guard prongs serving to prevent the action of the rail from loosening the hold between the spike and tie, as has been explained.

In the embodiment of my tie-plate shown by Fig. 5, the retainer flanges are arranged at the side edges of the plate to penetrate the wood across the grain; and the spike guards or prongs are formed at opposite sides of the plate, near the middle thereof, by punching triangular holes J in the plate, the metal so punched being bent down to form the triangular prongs and the spikes being inserted and driven through the holes J into the tie, the spikes being in contact with the base of the rail and the prongs. The spike-holes and prongs or guards may, however, be provided near diagonal corners of the plate, as shown by Fig. 6, and a single retainer flange E may be provided on one end edge of said plate, said flange extending only part way across said plate.

Among the advantages of my improved plate, in addition to those hereinbefore mentioned, is the saving of labor in laying the track. In laying the rails, it is of the utmost importance to first lay the tie-plates on the ties at proper measured distances apart from brace to brace, thus forming a good guide for the true alignment of the rails and saving the labor of "tamping up" and "cutting down" the ties and "shimming up" the rails.

The tie-plate is particularly useful on bridge-work and on curved portions of the track, as the rails are held so firmly and the wearing of the tie and spikes wholly obviated, that the rails cannot slip on the bed, thus reducing to a minimum the liability of the rails to spread and the consequent derailment of the train.

The tie-plate is cheap of manufacture, easily and quickly applied, and reliable, durable and efficient in service.

It is evident that changes in the form and proportion of parts and details of construction of the devices herein shown and described as an embodiment of my invention can be made by a skilled mechanic without departing from the spirit or sacrificing the advantages of my invention, and I therefore reserve the right to make changes and alterations as fairly fall within the scope of the same.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A tie plate for railway tracks, provided with the depending spike guard or prong I having cutting edges adapted to penetrate a tie, whereby a spike is adapted to bear or impinge against one face of said guard or prong while its head rests on the rail, substantially as and for the purpose described.

2. The combination with a rail and tie, of a tie-plate interposed between said rail and tie and provided with the depending spike-guards or prongs having the cutting edges which penetrate the tie, and the spikes each driven through said tie-plate into the tie, with its inner face in contact with said spike-guard or prong and its head bearing on the rail base, substantially as described, for the purpose specified.

3. A tie-plate for railway tracks provided, at diagonally-opposite points, with the depending triangular spike prongs or guards made integral with the plate by punching the latter and bending the metal, substantially as described.

4. A tie-plate for railway tracks, provided with the depending retainer-flanges E along its side edges and the spike-guards or prongs H, I, formed within its edges by cutting and bending said plate, the retainer-flange and spike guard each having a cutting-edge adapted to penetrate the tie or sleeper, as and for the purpose described.

5. A tie plate for railway tracks provided with a retainer flange and the spike-prongs or guards arranged to present their edges to the faces of the retainer-flanges, substantially as described.

6. A tie-plate for railway tracks, provided at its ends with the depending retainer flanges and at its sides with the spike guards or prongs which have their edges presented to the faces of the retainer flanges, substantially as described.

7. A tie-plate for railway tracks, comprising a flat plate, the longitudinal rail flange on the upper side of the plate, the depending retainer-flange E along the side edge, and the depending spike guards or prongs H, I, said retainer-flange and spike guard provided with the lower cutting edges, substantially as and for the purpose described.

8. The combination with a rail and a tie or sleeper, of the interposed plate provided, on its upper side, with a rail-flange and, on its lower side, with the depending retainer flanges E, F, and the spike-guards H, I, said spike guards lying in planes at right angles to the retainer flanges and said flanges and guards being forced or driven into the tie or sleeper, and the spikes driven into the tie with their upper ends bearing against the spike-guards and their heads bearing on the base of the rail, as set forth.

In testimony that I claim the foregoing I hereto set my hand and seal this 3d day of September, A. D. 1892.

JOSEPH A. HARRIS. [L. S.]

In presence of—
FLETCHER ROGERS,
WM. K. GROSS.

1229

(No Model.)

W. H. WILSON.

RAILROAD TIE PLATE.

No. 522,867. Patented July 10, 1894.

Fig: 1.

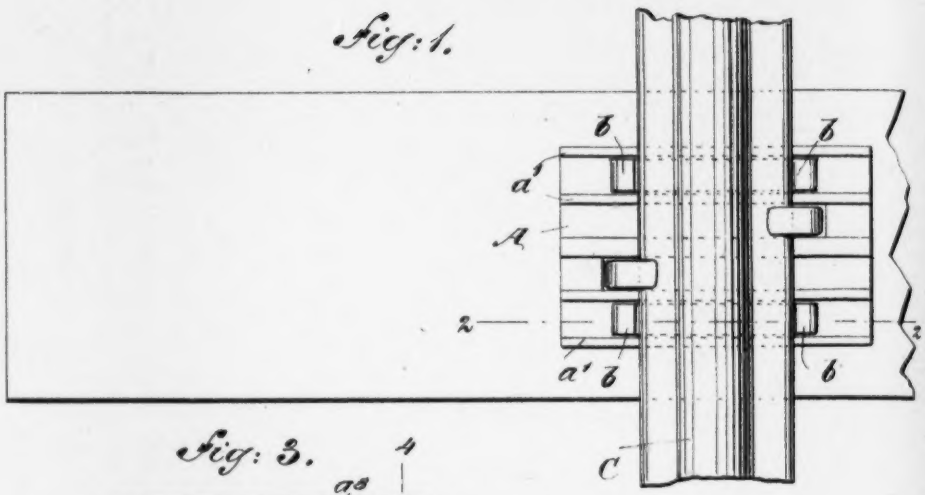


Fig: 3.

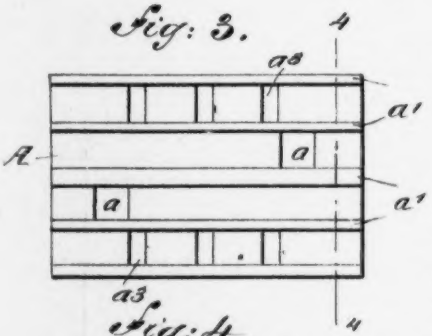


Fig: 2.

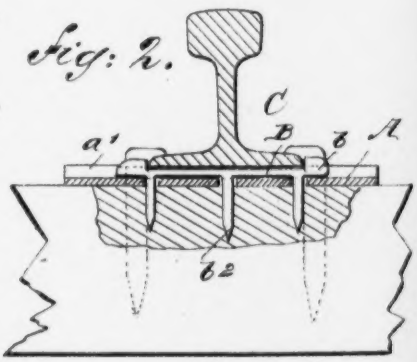


Fig: 4.

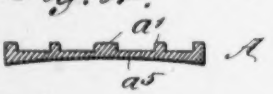


Fig: 5.

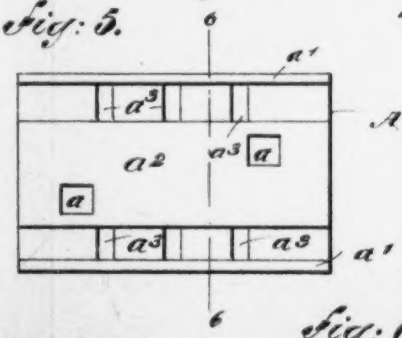


Fig: 7.

Fig: 8.

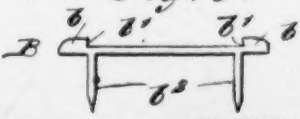
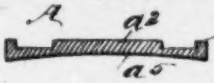


Fig: 6.



WITNESSES:

Chas. Nida.

J. L. McCauliffe

INVENTOR

W. H. Wilson

BY Munn & Co

ATTORNEYS.

1230

UNITED STATES PATENT OFFICE.

WALTER H. WILSON, OF NEW YORK, N. Y., ASSIGNOR TO RICHARD H. SMITH, OF SAME PLACE.

RAILROAD-TIE PLATE.

SPECIFICATION forming part of Letters Patent No. 522,867, dated July 10, 1894.

Application filed April 26, 1894. Serial No. 509,111. (No model.)

To all whom it may concern:

Be it known that I, WALTER H. WILSON, of New York city, in the county and State of New York, have invented a new and useful Railroad-Tie Plate, of which the following is a full, clear, and exact description.

The invention relates to the plates that are laid on and secured to wooden railroad ties, beneath the rails, for the purpose of preserving the ties, and the object of the invention is to provide a novel plate of this character having improved guards for the rail securing spikes, for effectively preventing shearing and grinding of the spikes by the rails.

The invention consists in the novel features hereinafter particularly described and defined in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the views.

Figure 1 is a broken plan view showing my improved tie plate applied. Fig. 2 is a sectional side elevation, the section being taken on the line 2—2 in Fig. 1. Fig. 3 is a plan view of the plate. Fig. 4 is a cross section on the line 4—4 in Fig. 3. Fig. 5 is a plan view illustrating a slightly modified construction. Fig. 6 is a cross section on the line 6—6 in Fig. 5; and Figs. 7 and 8 are side elevations, of different forms of guard devices employed in connection with the plate, to prevent shearing of the spikes.

In constructing a tie plate and its appurtenances in accordance with my invention, the plate A is formed with spike holes a properly located, and with longitudinal ribs on its upper surface to prevent buckling of the plate under the weight of the rail and passing trains, and these may consist of a series of narrow ribs a' of substantially equal width, as in Figs. 1, 3 and 4, or two narrow ribs a' at the sides and a broad central thickened portion a^3, as in Figs. 5 and 6.

In connection with the tie plate, separate guard devices B are employed, the guards being preferably of a proper thickness throughout the major portion of their length to be received between two ribs of the plate A and without projecting above the same, and the ends of the guards are thickened to provide heads b, which afford shoulders b', such shoulders being spaced apart sufficiently to accommodate between them the flange of a rail C. The guards are provided on their under sides with spike-like formations or securing shanks b^2, which may be three in number as in Figs. 2 and 7, two in number as in Fig. 8, or any other suitable number desired, and for the entrance of such securing shanks the plate A is provided with the desired number of orifices a^3.

The under side of the plate A is preferably concaved as at a^5, which construction causes the plate to so bed itself in the tie as to crowd the fibers toward the center of the plate and form an improved elastic support, and enables the tie to better withstand wear. This feature is however, not claimed in the present application, but in another application filed by me.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination with a tie plate, of guards for the rail securing spikes, the guards being separate from the plate, and having spike-like shanks adapted to enter a tie, substantially as described.

2. The combination, with a tie plate, of guards for the rail securing spikes, said guards being separate from the plate, ranging longitudinally of the same and having heads at their ends, the heads being spaced for receiving the rail flange between them, the guards further having spike-like shanks adapted to enter a tie, substantially as described.

3. The combination, with a tie plate, of separate guards for the rail securing spikes, the guards having spike-like shanks projecting from the under sides and the plates having orifices for the passage of such shanks, substantially as described.

4. The combination, with a tie plate, having longitudinal ribs on its upper surface, of guards for the rail securing spikes, the guards being separate from the plate, fitting between the longitudinal ribs thereof, and having means for securing them, substantially as described.

WALTER H. WILSON.

Witnesses:
JNO. M. RITTER,
J. L. MCAULIFFE.

1232

(No Model.)

D. SERVIS.

RAILWAY TIE PLATE.

No. 524,868. Patented Aug. 21, 1894.

Fig. 1

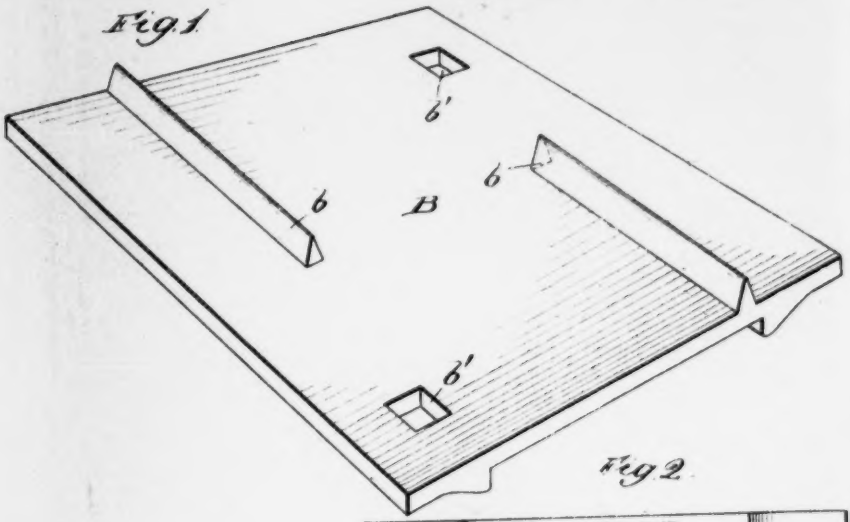


Fig. 2

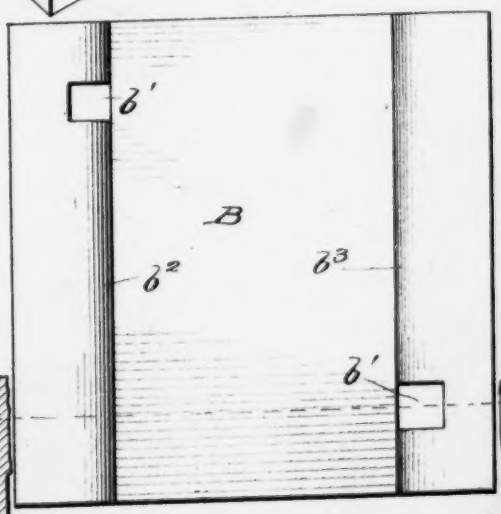
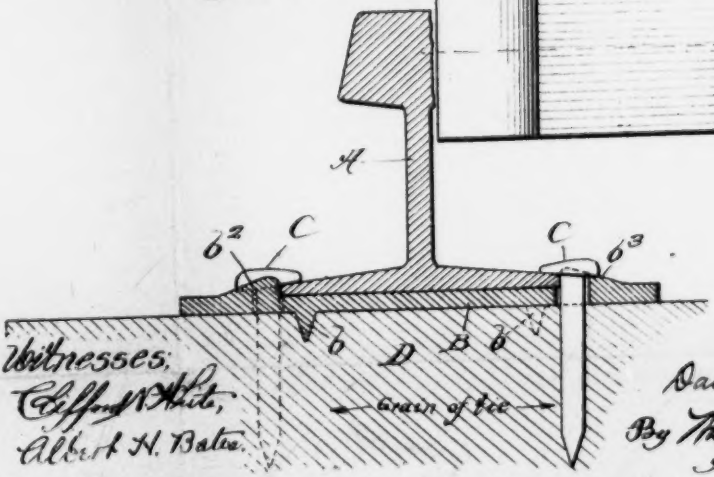


Fig. 3



Witnesses:
Clifford White,
Albert H. Bates.

Inventor.
David Servis
By Wilbur N. Chamberlain
Attorney.

UNITED STATES PATENT OFFICE.

DAVID SERVIS, OF CHICAGO, ILLINOIS.

RAILWAY-TIE PLATE.

SPECIFICATION forming part of Letters Patent No. 524,868, dated August 21, 1894.

Application filed October 31, 1893. Serial No. 489,597. (No model.)

To all whom it may concern:

Be it known that I, DAVID SERVIS, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented a certain new and useful Improvement in Railway-Tie Plates; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its object the production of what is popularly known as a "railway tie plate" that is a plate which is placed between the tie and a railway rail. It consists in a combination of features hereinafter described and claimed.

In the drawings: Figure 1. is a view of the under side of my plate. Fig. 2. is a view of the top of the plate. Fig. 3. is a vertical section on the line 3—3 of Fig. 2 showing the relative positions of the rail, plate and tie.

In carrying out the invention A represents the rail, B the plate, C the spikes and D the tie. On the under side of the plate B are two flanges or ribs or ridges b preferably tapering a more or less of a sharp edge, and located diagonally opposite each other. Each rib extends only half way (more or less) across the plate and in the opposite corners are the spike holes b'. Preferably the ribs b are immediately under or closely adjacent to the point where the edge of the rail base comes above. These ribs are parallel with the rail and consequently extend across the grain of the tie. On the top side of the plate may if desired be provided the flanges b^2—b^3 one on each side of the rail, although these flanges and particularly the flange b^3 might be dispensed with if desired. Their function is of course to hold the spikes in preventing the rail from lateral movement on the plate.

I now desire to call attention to the essential feature of my invention which consists in the provision of the under side of the plate with the two ribs b, alternating with each other, as shown. By means of these ribs, the plate is improved in several respects. Their position substantially under the edges of the rail base prevent the tendency of the plate to buckle beyond the edges of the rail base. Their position alternating with each other, prevent them from cutting into the same portion of the tie lengthwise, that is prevents them from cutting out a portion of the tie and thus lessen or remove altogether the holding power of the fiber of the tie. By their position across the grain of the tie they effectually hold the plate against any movement lengthwise of the tie and thus prevent any lateral movement of the rail. I would also call attention to the fact that while the ribs b alternate with each other, so also do the spike holes alternate with each other and with the ribs. Thus while the advantage of having the rib under the edge of the rail base is obtained, yet the tie is not weakened by having the rib and spike enter adjacent to each other. If such were the case the holding power of each would be greatly weakened. By having the ribs at diagonally opposite corners and the spikes at the other diagonally opposite corners, the plate is held squarely in position and is prevented absolutely from twisting, from buckling, or from moving lengthwise of the tie. So also by the above arrangement the tie is not disintegrated at the points where the greatest solidity is required namely underneath the plate.

I am aware that ribs have heretofore been placed on the under side of the plate, said ribs running both with the grain of the tie and across the same, but where they run parallel with the grain they do not resist effectually the lateral thrust of the rail and where they run across the grain they cut out a portion of the tie and thus weaken it at the point where the greatest solidity is required. I am also aware that it is old to extend a single rib across the grain at the middle of the under side of the plate, but such a construction, because of the fact that the surface of the tie is not always smooth, permits a rocking motion of the plate, thus causing the flange or rib to soon enlarge the recess in the tie in which it rests, causing a play of the plate around the spikes and soon loosening the entire plate. None of the above constructions do I claim as my invention, but

What I claim is—

1. A railway tie plate, provided on its under side with two continuous or unbroken ribs arranged to extend across the grain of the tie

1234

when in position thereon, neither of said ribs extending entirely the width of the plate, and said ribs being out of longitudinal alignment with each other substantially as described.

2. A railway tie plate provided on its under side with two ribs arranged to extend across the grain of the tie when in position, said ribs located diagonally opposite each other, so that they enter the tie in different longitudinal portions, substantially as described.

3. A railway tie plate provided on its under side with two ribs arranged to extend across the grain of the tie, when in position thereon, said ribs being diagonally opposite each other and substantially under the edges of the rail base, said tie plate also provided with spike holes arranged diagonally opposite to each other and to the ribs, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

DAVID SERVIS.

Witnesses:
W. H. CHAMBERLIN,
THOS. G. GRIER

933 & 1934 EXHIBIT S35.

KATE S. HOLMES,
Notary Public.

1236

(No Model.)

S. F. CLARK.

TIE PLATE.

No. 529,854. Patented Nov. 27, 1894.

Fig. 1.

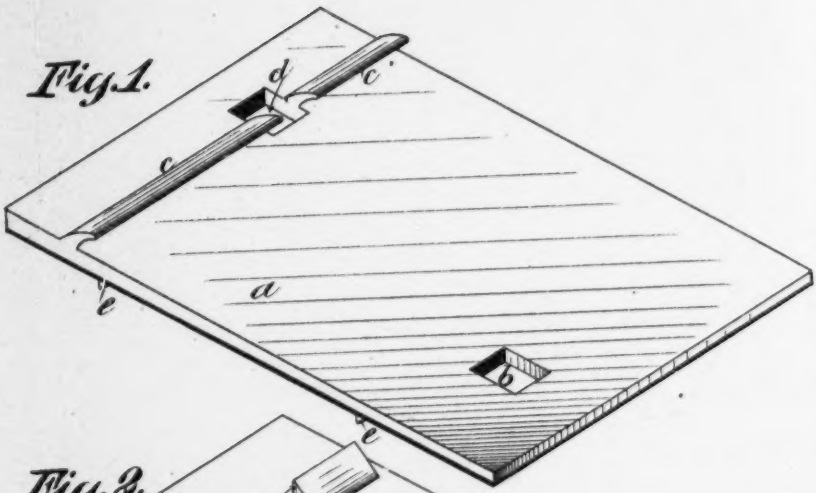


Fig. 2.

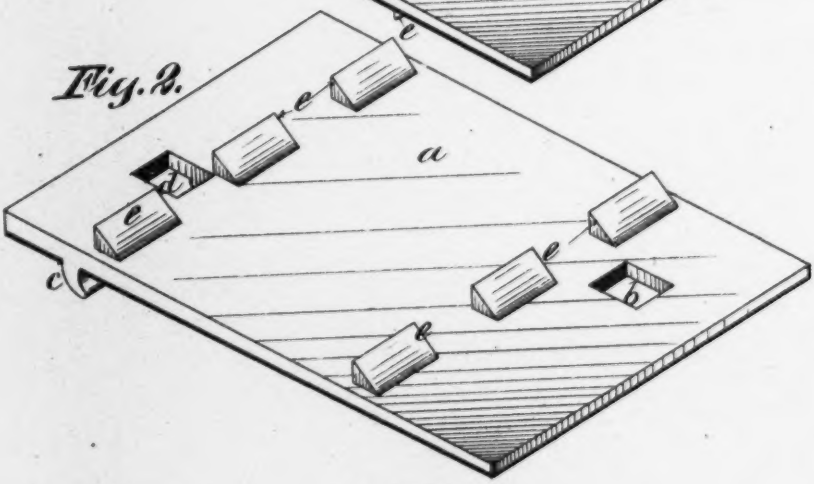


Fig. 3.

Fig. 4.

Fig. 5.

Witnesses:

D. W. Gardner.

Fabius Caragan

Inventor:

S. F. Clark by Munn & Co

UNITED STATES PATENT OFFICE.

SIGOURNEY FAY CLARK, OF ELIZABETH, NEW JERSEY.

TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 529,854, dated November 27, 1894.

Application filed January 17, 1894. Serial No. 497,133. (No model.)

To all whom it may concern:

Be it known that I, SIGOURNEY FAY CLARK, a citizen of the United States, and a resident of Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Tie-Plates, of which the following is a specification.

This invention relates to certain new and useful improvements in tie plates for railroads, and has for its object the production of a plate having the minimum tendency to buckle, incapable of longitudinal displacement, and best adapted to receive and transmit the various strains to which it may be subjected; which will have an intimate relation with both the tie and the rail, and at the same time, be simple and economical in manufacture, and strong and durable in use.

To these ends, therefore, my said invention consists in a tie-plate, substantially of the construction, and having the various qualities, as hereinafter more particularly set forth and pointed out in the claims.

Referring to the accompanying drawings, in the several figures of which like parts are similarly designated, Figure 1, is an isometrical perspective view of the upper face of one of my improved plates. Fig. 2, is a similar view of the lower face. Fig. 3, is a longitudinal sectional view, illustrating a modification of the bottom spurs; and Figs. 4 and 5, are detail views of further modifications of the bottom spurs.

a, is a tie-plate, thicker at one end than at the other, and preferably tapering or wedge shaped in longitudinal section. This plate is provided at its thinner end with the spike opening *b*, and has, on its upper face, and at its thicker end, a transverse rib or shoulder *c*, the top portion of which is curved inwardly, as shown. This shoulder is intersected or divided by the spike-opening *d*, arranged diagonally opposite the opening *b*, and projecting into the plate *a*, a slight distance beyond the inner side of shoulder *c*. The lower face of the plate is formed with a number of projections or spurs *e*, disposed in any suitable or convenient manner, and straight, perpendicular or abrupt on the side toward the thicker end of the plate, and inclined or tapering toward the inner end thereof. If desired, these spurs may be provided on their abrupt sides with the groove, recess or cut-out *e'*, shown in Fig. 3, or they may be outwardly inclined as shown in Fig. 4, or curved, instead of abrupt on their outer faces, as shown in Fig. 5, for a purpose to be presently explained.

In use, the flange of one side of the rail base is laid within the curve of shoulder *c*, the upper portion of which, of course, overlaps said flange, and prevents the rail from being lifted away from the plate; at the same time relieving the strain upon the head of the spike passing through the opening *d;* and by elongating the spike-opening *b*, and having the opening *d*, project into the plate beyond the inner side of the shoulder *c*, any inequalities or variations of the base flange of the rail may be compensated for, and a firm and secure engagement of the spike heads therewith assured. The thrust or first principal strain to be borne by the plates, is compressive and oblique, toward the end bearing the shoulder *c*, and by thickening the plate at this point, its durability is much enhanced, the plate prevented from buckling, and less material need be used in the opposite end. It will also be found that by forming the spurs *e*, straight or abrupt on the side opposite the direction of the thrust, or by inclining or curving them on said side, both longitudinal displacement of the plate and lateral displacement of the rails, as well as the lifting action experienced from passing loads, is in a large degree obviated, which latter end is still further conduced when said spurs are inclined, as in Fig. 4, curved as in Fig. 5, or formed with the recess or cut-out *e'*, shown in Fig. 3, within which the wood fibers of the tie become lodged, thus firmly holding the plate in position.

It will be obvious that many changes and alterations may be made in the structure herein shown and described, without departing from the principle and scope of my invention, and involving merely a mechanic's skill. I have found, however, that in my construction, as hereinbefore set forth, the metal of the plate is distributed to combine the best results with the least amount of metal, thus making the plate light and strong, and at the same time cheap to manufacture. Nor do I wish to limit myself to any portion-

lar degree of taper or incline, which obviously may vary greatly to meet different exigencies.

What I claim as new, and desire to secure by Letters Patent, is—

1. A railroad tie-plate provided on its lower face with spurs adapted to pass into and beneath a portion of the tie, and prevent lateral and perpendicular displacement, substantially as described.

2. A railroad tie-plate, thicker at one end than at the other, formed on its upper face with an inwardly curving divided shoulder, and on its lower face with a suitable number of spurs adapted to pass into and beneath a portion of the tie, substantially as described.

3. A railroad tie-plate tapering or wedge-shaped in longitudinal section, formed on its upper face with an inwardly curving shoulder, and on its lower face with a suitable number of spurs; a spike-hole located at one side of the center of the plate, dividing the shoulder and extending beyond the inner side thereof, and a diagonally opposite elongated spike-hole, substantially as described.

4. A railroad tie-plate tapering or wedge-shaped in longitudinal section, formed with an inwardly curving transverse rib on its upper face and at its thicker end; a spike-hole located at one side of the center of the plate, dividing the shoulder and extending beyond the inner edge thereof; an elongated spike-hole, arranged diagonally opposite thereto, and spurs formed on the bottom of the plate, adapted to pass into and beneath a portion of the tie, substantially as described.

Signed at New York, in the county of New York and State of New York, this 15th day of January, A. D. 1894.

SIGOURNEY FAY CLARK.

Witnesses:
FREDERIC CARRAGAN,
J. B. TANNER.

939 & 1940 EXHIBIT 530,175.

KATE S. HOLMES,
Notary Public.

1240

(No Model.)

T. R. GABEL.

COMBINED TIE PLATE AND RAIL BRACE.

No. 530,175. Patented Dec. 4, 1894.

Fig. 1.

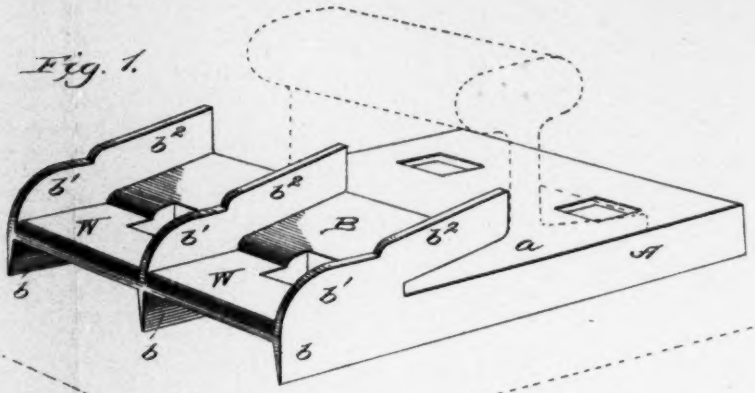


Fig. 2.

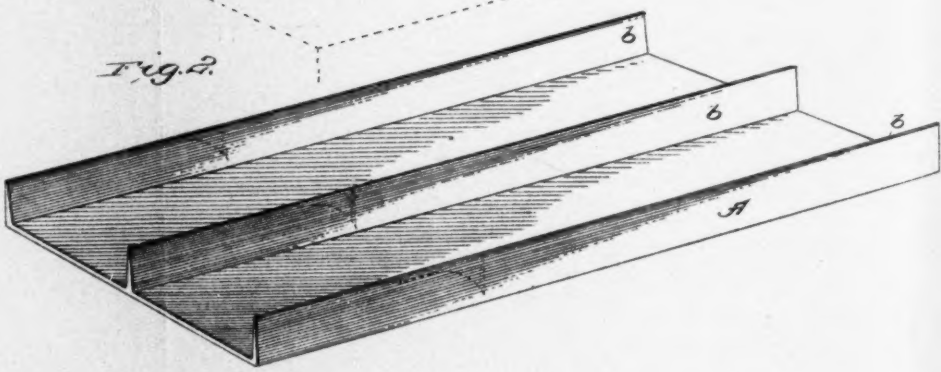
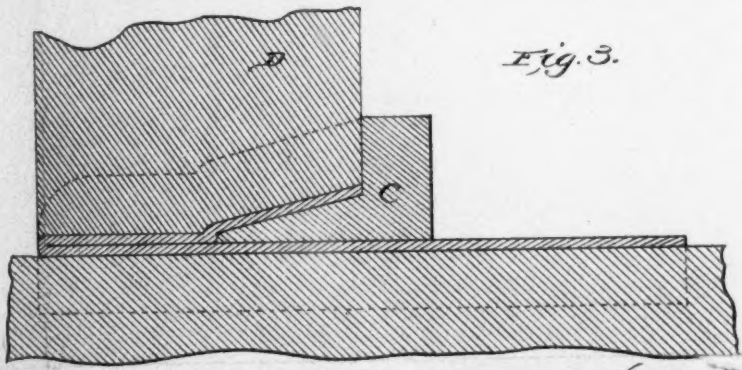


Fig. 3.



Witnesses:
Harry D. Rohrer.
Wm. C. Dyer.

Inventor
Thomas R. Gabel
By F. W. Ritter Jr
Atty.

THE ROBBS PETERS CO. PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THOMAS R. GABEL, OF ALBUQUERQUE, TERRITORY OF NEW MEXICO, ASSIGNOR TO THE Q. & C. COMPANY, OF CHICAGO, ILLINOIS.

COMBINED TIE-PLATE AND RAIL-BRACE.

SPECIFICATION forming part of Letters Patent No. 530,175, dated December 4, 1894.

Application filed May 24, 1894. Serial No. 512,368. (No model.)

To all whom it may concern:

Be it known that I, THOMAS R. GABEL, a citizen of the United States, residing at Albuquerque, in the county of Bernalillo, Territory of New Mexico, have invented certain new and useful Improvements in a Combined Tie-Plate and Rail-Brace; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1, is a perspective view of a tie plate and rail brace embodying my invention, with portions of a rail and tie dotted in to show the relation of the tie plate and brace thereto. Fig. 2, is a view of a piece of tie plate bar, the dotted lines indicating how the same may be cut in the manufacture of my improved tie plate, and Fig. 3, is a sectional view of an anvil, mandrel and drop die which may be employed in manufacturing said combined tie-plate and rail brace.

Like symbols refer to like parts wherever they occur.

The object of my invention is the production of a light, strong and resilient combined tie-plate and rail brace, adapted to obviate the hammering of the rail by the wheels of passing trains, to support the rails against the side thrust of the moving wheels, and counteract any tendency of the tie-plate to buckle under the tread of the loaded wheel.

It is now well understood that in the laying and maintaining rail road tracks, some form of tie-plate should be employed to conserve the way, and that in order to utilize the resiliency of the tie, as well as for economic reasons, such tie plates should be as light as is consistent with strength and stiffness; and it is also well understood that the best results are obtained when the tie-plate is trussed on its under surface by a rib or ribs parallel with the fiber of the tie and transverse of the rail [illegible]; and furthermore, a support or abutment for the upper face of the tie-plate to resist the lateral thrust of the rail is recognized as desirable. To meet these several indications, [illegible]e tie plate with an upwardly and in[illegible]ected section or web which con[illegible] foot flange of the rail and bears [illegible]dge against the web of the rail at right angles thereto, said brace web being reinforced by truss ribs, which are, preferably, continuations of the truss ribs of the under side of the tie plate, and such a construction embodies the first feature of my invention.

In order to reinforce the tie plate at that point or on the line which receives the thrust from the foot flange of the rail, I bull-doze or weld the fold of the plate from the edge of the tie-plate to the foot of the brace, and such a construction embodies a second feature of my invention.

I will now proceed to describe my invention more fully so that others skilled in the art to which it appertains may apply the same.

In the drawings A indicates the tie-plate proper, B the rail brace thereof and W the welded fold extending from the edge of the tie-plate to the rail seat and foot of the rail brace.

The rail brace B, which extends from the welded fold W to the vertical web of the rail, is made to conform to and rest upon the top of the foot flange of the rail and by its free edge bears against the web of the rail so as to support the rail under the side thrust of a passing wheel.

On the under side of the tie-plate and extending transversely of the rail seat a are one or more truss ribs b which also extend inward upon the upper face or fold of the welded portion as at b', and thence upward and forward on the web rail brace B, as at b^2 so as to stiffen the web brace B against buckling, the web in turn supporting and maintaining the rib or ribs b^2 against lateral strain. As a result of the construction pointed out a combined tie plate and rail brace will be obtained, wherein are found a trussed tie-plate and trussed web rail-brace, the tie-plate reinforced parallel to the line of thrust of the rail. Such a tie-plate and rail-brace are preferably constructed by first rolling or otherwise forming a bar having on one face one or more longitudinal ribs of the general character shown in Fig. 2, then notching the rib or ribs of said bar, as indicated by the dotted lines on said figure, next folding the plate upon itself for a short distance, and finally, inserting a mandrel C having the outline of the foot flange and vertical web of a rail—(as indicated in Fig. 3) and

finally subjecting the plate at a welding temperature,—to a drop die D or equivalent means which will weld the folds from the edge of the rail seat to the foot of the rail brace and parallel with the rail seat.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A tie-plate, having a trussed web rail-brace, which conforms to the foot-flange of a rail with its free edge adapted to bear against the web of the rail substantially as and for the purposes specified.

2. A tie-plate having a truss rib on its under surface, and provided on its upper surface with a trussed web rail-brace, which conforms to the foot-flange of the rail with its free edge adapted to bear against the web of the rail, substantially as and for the purposes specified.

3. A combined tie-plate and rail-brace, having a welded fold extending from the edge of the tie-plate to the foot of the rail-brace, substantially as and for the purposes specified.

4. A tie-plate having a trussed web rail-brace, and a welded fold or reinforce which extends from the foot of the rail-brace to the edge of the tie-plate, substantially as and for the purposes specified.

In testimony whereof I affix my signature in presence of two witnesses, this 14th day of May, 1894.

THOMAS R. GABEL.

Witnesses:
P. C. ALLEN,
F. B. SUTTON.

45 & 1946 EXHIBIT S37.

KATE S. HOLMES,
Notary Public.

(No Model.) 2 Sheets—Sheet 1.

B. WOLHAUPTER.

RAILWAY TIE PLATE.

No. 530,738. Patented Dec. 11, 1894.

Fig. 1.

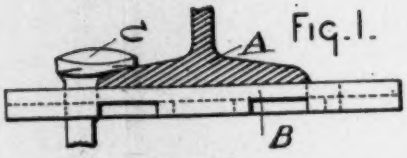


Fig. 3.

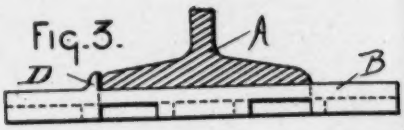


Fig. 2.

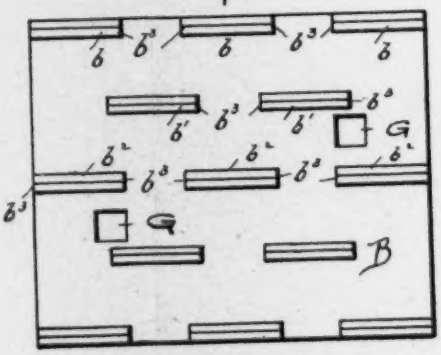


Fig. 4.

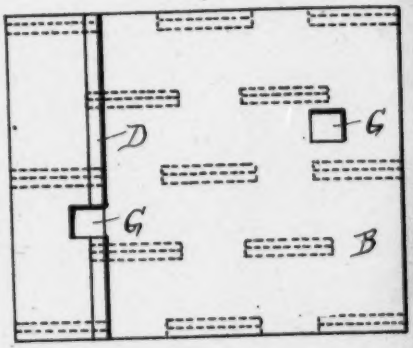


Fig. 5.

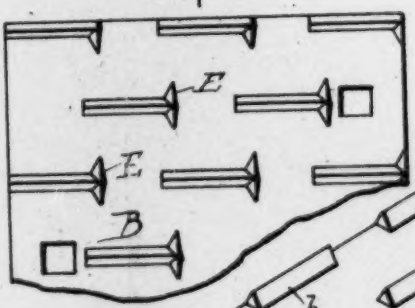
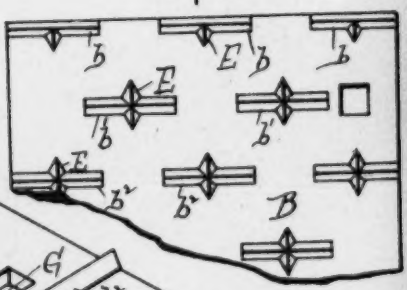


Fig. 6.



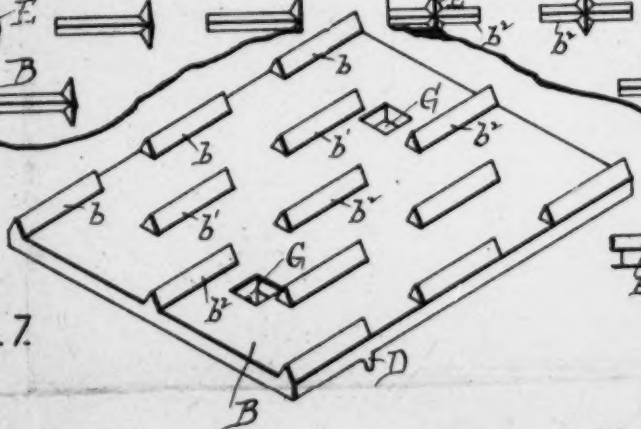
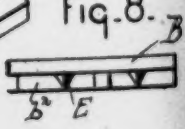


Fig. 7.

Fig. 8.



Witnesses
Florence King
C. J. Shipley

Inventor
Benjamin Wolhaupter
By his Attorney
Walter H. Chamberlin

(No Model.) 2 Sheets—Sheet 2.

B. WOLHAUPTER.

RAILWAY TIE PLATE.

No. 530,738. Patented Dec. 11, 1894.

Fig. 9.

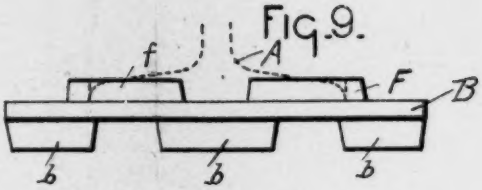


Fig. 11.

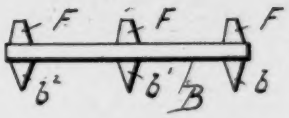


Fig. 10

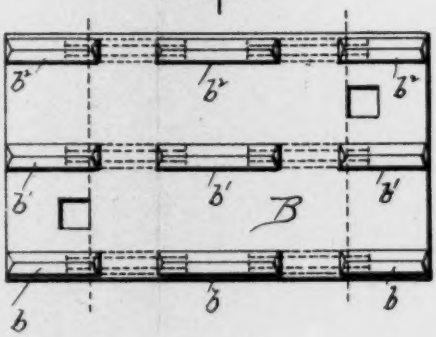


Fig. 12.

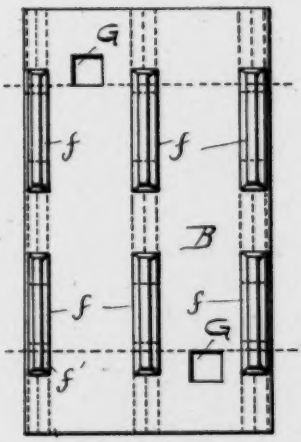


Fig. 13.

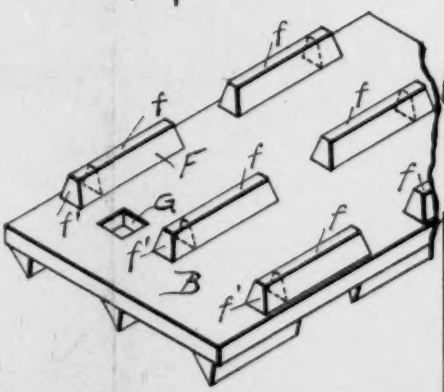


Fig. 14.

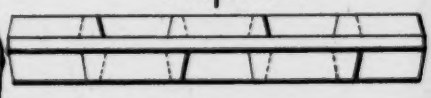
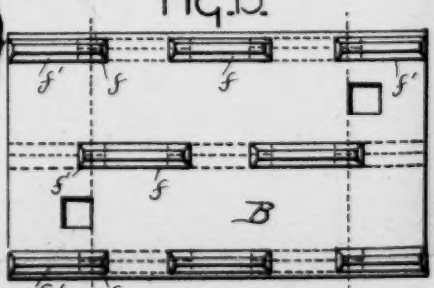


Fig. 15.



Witnesses
Florence King.
C. J. Shipley

Inventor
Benjamin Wolhaupter
By his Attorney
Walter H. Chamberlin

UNITED STATES PATENT OFFICE.

BENJAMIN WOLHAUPTER, OF MORGAN PARK, ILLINOIS.

RAILWAY TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 530,738, dated December 11, 1894.

Application filed March 10, 1894. Serial No. 503,111. (No model.)

o all whom it may concern:

Be it known that I, BENJAMIN WOLHAUPTER, a subject of the Queen of Great Britain, siding at Morgan Park, county of Cook, tate of Illinois, have invented a certain new nd useful Improvement in Railway Tie-lates; and I declare the following to be a ll, clear, and exact description of the in-ention, such as will enable others skilled in he art to which it pertains to make and use he same, reference being had to the accom-anying drawings, which form a part of this pecification.

My invention has for its object the produc-on of a railway tie plate, that is to say, a late that is interposed between the rail and e of a railway track.

The invention consists in the combination features hereinafter described and claimed.

In the drawings: Figure 1 is a cross section a portion of a rail showing the plate in dge elevation. Fig. 2 is a view of the under de of the plate. Fig. 3 is a cross section of portion of a rail with the plate in elevation owing a flange on the top side of the plate. ig. 4 is a plan view of the plate. Figs. 5 nd 6 are views of the under side of the plate, ach showing a slight variation in the form f the ridges. Fig. 7 is a perspective view f the under side of the plate. Fig. 8 is an dge elevation of a portion of the plate shown Fig. 6. Fig. 9 is an edge elevation of a ariation in the form of the top side of the late. Fig. 10 is a plan view of the same. ig. 11 is an end edge elevation. Fig. 12 is plan view at right angles to Fig. 10. Fig. 3 is a perspective view of the plate. Fig. 14 an edge elevation, and Fig. 15 a plan.

Heretofore in the manufacture of this class f plate two broad styles or forms of plates ave been manufactured, namely: those herein the ridges or engaging devices on he under side of the plate are adapted to en-r the tie parallel with the grain of the tie nd not to cut the fiber, but merely to sepa-ate it on the line of the grain thereof; and econdly, those in which the engaging devices hereby the plate is engaged to the tie were arranged as to extend transversely of the rain of the fiber and thus cut into and sever the fiber. These two forms are clearly distinct from each other, since each proceeds on an entirely different theory. Those plates in which the engaging devices are parallel with the grain of the tie are manufactured on the theory that it is unadvisable to cut the grain of tie since the tie is thereby weakened, and the grain being cut transversely the moisture is permitted to enter the fiber and thus rot it, while those who prefer the second class assert that the cutting of the fiber is a secondary consideration when the fact that the plate is prevented absolutely from creeping along the tie and thus widening the gage of the road is considered; or in other words the advocates of the transverse engaging devices, that is, those that cut into the grain at right angles or substantially right angles to the grain, base their argument upon the ground that the plate forms a positive and absolute stop against lateral movement by the rail without depending on the spikes to prevent it.

My invention relates to those plates wherein the engaging devices extend parallel with the grain, or in other words, parallel with the length of the tie, and has for its object the production of such a form of engaging device as that while the fiber is not injured or cut transversely yet an effective means is provided whereby the plate is prevented absolutely from creeping along the tie in the direction of the grain. With this explanation and bearing in mind always that this invention belongs to that class in which the ridges or its engaging devices extend parallel with the grain of the fiber of the tie, I will proceed to more particularly describe the parts.

A represents the rail, B the plate and C the spike. On the under side of the plate is a series of ridges extending along the plate in such a manner that when the plate is placed upon the tie the ridges will be parallel with the grain of the fiber of the tie. These ridges are divided into sections b, b', b^2, &c.

In Fig. 2 I have shown the plate provided with five ridges, two of them divided into two sections each, and three of them divided into three sections each. These divided ridges

are so arranged that a division of one ridge will be out of transverse alignment with the division of the next adjacent ridge. For instance, each of the sections b is out of transverse alignment with each of the sections b' while each of the sections b' is out of transverse alignment also with each of the divisions b^2. Now it will be seen that when this plate is placed upon the tie and the ridges b, b', b^2 pressed into the fiber there will be a space between each of the divisions of each ridge where the fiber will not be pressed apart or disturbed. Each of the ends b^3 therefore becomes an abutting end to prevent the plate from creeping along the tie in the direction of its length, since for the plate to move these blunt ends must separate the fiber. The capacity therefore of resisting any movement of the plate along the tie is very largely increased because of the divided ridges. Again the placing of these divisions of the ridges out of transverse alignment with each other prevents the plate from buckling since each part of the plate is reinforced owing to the fact that the ends of each division lap over slightly the division of the next adjacent ridge. Again by extending the ridges parallel with the grain the plate is prevented from buckling or bending since the ridges are extended at right angles to the rail. This is important since there is no tendency to buckle in a direction parallel to the rail since the load is distributed throughout the length in this direction, but the plate extending beyond the edges of the rail flange brings the load in the middle of the plate and permits the edges thereof to curl up or buckle unless reinforced by the ridges extending at right angles to the rail.

I will now proceed to explain some variations in my plate.

In Figs. 3 and 4 I have shown on the top side of the plate a ridge D against which the rail may abut so that the rail cannot move laterally upon the plate.

In Figs. 5 and 6 I have shown slight fins or projections E extending from the ridges laterally, thus materially increasing the resisting capacity of the plate to longitudinal movement on the tie.

On sheet 2 I have shown a variation in the form of the top side of the plate. The plate is originally formed with a series of ridges F on the top side, and then the portion f of these ridges cut away to form a place within which to rest the rail, the portion f' forming a projection or shoulder against which the flange or rail may rest. The reason for thus forming the ridges F on the top side is that it can be conveniently done in rolling the plate and afterward cutting them away. It will be noticed by reference to Fig. 11 that these ridges F are substantially the same width as the ridges b, b', b^2, and as the thickness of the plate, thus enabling them to be easily cut away to form the way for the rail. Spike holes G may or not be provided depending upon the length of the plate, but I prefer to make the plate long enough so that the spike holes will have to be provided. I am aware that plates have heretofore been made in which ridges on the under side have been caused to enter the tie parallel with the grain. I am also aware that plates have heretofore been constructed in which divided ridges were extended transversely of the grain of the tie, but these divisions were obviously not for the purpose of my divided ridges. Constructions such as just named, I do not of course claim, but

What I claim is—

1. A railway tie plate provided on its under side with one or more elongated divided ridges inside the outer edges of the plates, said ridges extending when in position upon the tie parallel with the grain of the tie, substantially as described.

2. A railway tie plate provided on its under side with one or more elongated divided ridges inside the outer edges of the plate, said ridges extending when in position on the tie, parallel with the grain of the tie and on its upper side with one or more rail abutting ridges, substantially as described.

3. A railway tie plate provided on its under side with one or more elongated divided ridges inside the outer edges of the plate, said ridges extending when in position on the tie parallel with the grain of the tie, a division of one ridge being out of transverse alignment with the divisions of the next adjacent ridge, substantially as described.

4. A railway tie plate provided on its under side with a series of divided ridges extending when in position on the tie parallel with the grain of the tie, a division of one ridge being out of transverse alignment with the divisions of the next adjacent ridge and the ends of a division of one ridge overlapping the ends of a division of the next adjacent ridge, substantially as described.

5. A railway tie plate provided on its under side with a series of ridges extending parallel with the grain of the tie, one or more of the ridges provided with spurs or projections, substantially as described.

6. A railway tie plate provided on its under side with a series of divided ridges extending when in position on the tie parallel with the grain of the tie, one or more of the divisions provided with projecting spurs, substantially as described.

7. A railway tie plate provided on its under side with a series of engaging devices consisting of one or more divided ridges adapted to engage it to the tie, and on its upper side with a series of ridges extending at right angles to the rail, said ridges being adapted after the plate is rolled to be cut away to form a way for the rail, substantially as described.

8. A railway tie plate provided on its under side with a series of divided ridges extending when in position parallel with the

rain of the tie and on its upper side with a eries of ridges extending parallel with the idges on the under side, each of the said up- er ridges being adapted after being rolled be cut away to form a way for the rail, sub- antially as described.

9. A railway tie plate provided on its un- r side with a series of divided ridges ex- nding when in position on the tie, parallel ith the grain thereof, and provided on its p with a series of divided ridges parallel with the ridges on the under side, the ends of the divisions of the upper ridges overlap- ping the ends of the divisions of the lower ridges, substantially as described.

In testimony whereof I sign this specifica- tion in the presence of two witnesses.

BENJAMIN WOLHAUPTER.

Witnesses:
WALTER H. CHAMBERLIN,
FLORENCE KING.

1250

(No Model.)

R. MORRELL.

TIE OR WEAR PLATE.

No. 531,637. Patented Jan. 1, 1895.

Fig. 1.

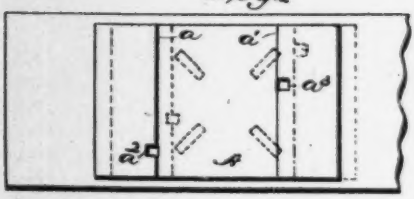


Fig. 2.

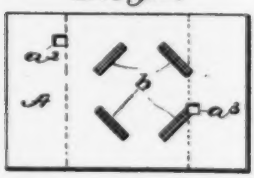


Fig. 4.

Fig. 5.

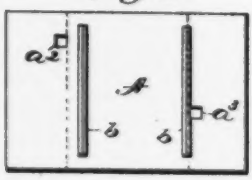


Fig. 3.

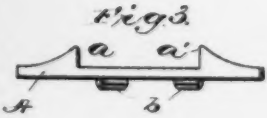
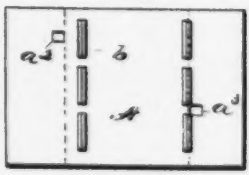


Fig. 6.



Witnesses:
J. M. Fowler Jr.
Thomas Durant

Inventor:
Robert Morrell
By Church & Church
his Attorneys

UNITED STATES PATENT OFFICE.

ROBERT MORRELL, OF SUMMIT, NEW JERSEY, ASSIGNOR OF THREE-EIGHTHS TO CHARLES S. DAY, OF SAME PLACE, AND W. W. McCULLOM.

TIE OR WEAR PLATE.

SPECIFICATION forming part of Letters Patent No. 531,637, dated January 1, 1895.

Application filed April 3, 1894. Serial No. 506,211. (No model.)

To all whom it may concern:

Be it known that I, ROBERT MORRELL, of Summit, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Tie or Wear Plates; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

This invention relates to improvements in that class of railway appliances known as wear or tie plates.

The principal objects of my present invention are first to provide an efficient means for firmly and securely confining the plate in position upon the surface of the tie with the least injury to the latter and without distorting the plate, and, second, to provide for lateral adjustment of the tie plate, to compensate for displacement occasioned by wear or defective seating, and avoiding excessive mutilation of the tie.

In the accompanying drawings, Figure 1 is a top plan view, Fig. 2 is a bottom plan view and Fig. 3 an edge view of a tie plate containing an embodiment of the invention. Figs. 4, 5 and 6 illustrate modifications.

Similar letters of reference in the several figures indicate the same parts.

The tie plate A is preferably provided upon its upper surface with two parallel shoulders or ribs *a*, *a'* (although one only is required under certain circumstances), between which the base of the rail is secured, and holes a^2 a^2 are provided on opposite sides for the insertion of the spikes.

In the preferred form illustrated in Figs. 1 to 3, the under face of the tie plate is furnished with four symmetrically disposed projections *b* which are driven into the surface of the tie until the plate makes contact therewith, and they serve to retain the tie plate in position and to resist motion in all directions in a horizontal plane.

The projections *b* are wedge shape in cross section the base or thicker portion of the wedge merging into the surface of the plate, and they are so disposed that their edges or cutting faces stand diagonally to the plate and to the grain of the wood. Moreover the projections lie wholly within the margin of the plate.

A four fold advantage results from this arrangement. In the first place, the cavities formed by the projections are entirely covered and the entrance of water therein prevented. In the second place the cutting or penetrating edges cross the grain of the wood, and splitting of the tie is prevented. In the third place, the diagonal arrangement of the ribs results in strengthening the plate, forming braces on the under surface which resist any tendency of the plate to bend or curl; and in the fourth place, the diagonal arrangement provides a more secure support and resistance to motion either laterally or longitudinally of the tie.

In ordinary use tie plates are subjected to forces which tend to force them in two directions, the one laterally of the rail and longitudinally of the tie, developed most strongly on curves; and the other or creeping movement in the direction of the running train, that is laterally of the tie.

The diagonal disposition of the holding ribs *b* is especially well calculated to resist movement of the plate in either direction, for whether the direction of motion be longitudinally or laterally of the tie it will be borne by the sides or extended faces of all the projections, two of said projections presenting converging walls between which the wood is compressed while the opposite or rearmost projections present diverging surfaces.

Another advantage derived from this construction is the extended support which the elongated edges of the diagonally arranged projections give to the plate before and during the bedding operation. In applying the tie plates the usual practice is to first locate the plates properly under the rails and insert the spikes and drive them down so as to firmly grip the rail. After this the plates are subjected to the pressure of a passing train or weight by which the projections are forced into the tie until the plate takes a firm bearing thereon, when the spikes are finally driven home. During the preliminary placing of the plates the diagonal edges of the projections afford a broad and firm support so that when the pressure is applied they enter squarely

DARK PAGE BLEED THRU

into the wood and are not liable to be displaced laterally. Moreover, owing to the diagonal arrangement they brace the plate and prevent its being bent or curled up when subjected to the great pressure employed in seating them.

Instead of arranging the wedge shaped projection on lines radiating from a center as shown in Figs. 1 to 3, they may with like effect be arranged as illustrated in Fig. 4.

The provision made for adjusting the tie plate laterally of the rail and longitudinally of the tie is designed more especially for use in connection with tie plates provided with double ribs on the upper surface.

These plates are employed mostly on curves when it is desired to more securely hold the rails from lateral movement in either direction. After the plates have been in use for some time, and subjected to the action of fast and heavy express trains, the socket formed by the projections become enlarged, owing to the great pressure to which the rails are subjected, resulting in a slight spreading of the rails. Again, it may sometimes happen in setting the tie plates that they will be forced slightly to one side as the projections penetrate the wood. After the plates have once been seated their position cannot conveniently be changed without injury to the tie, either by leaving unfilled cavities for the reception of water, or by so enlarging the cavities first formed as to destroy in a measure the holding capacity of the projecting ridges.

To provide for a limited adjustment of the tie plate, I arrange the projections, whether of the preferred variety shown in Figs. 1 to 4 or of other known forms, such for example as are illustrated in Figs. 5 and 6, symmetrically, that is to say, with the projection or projections on one side of the center corresponding in location and arrangement with that on the opposite side, but, instead of locating the projection equidistant from a line drawn longitudinally of the plate midway between the two ribs a a', they are arranged at unequal distances therefrom, that is to say the projection or projections on one side are slightly nearer the median line than those on the other side, or what amounts to the same thing, the projections located on one side are slightly nearer the rib or shoulder a than are those on the other side to the rib or projection a'. Hence it may be said that the projections b are symmetrically and eccentrically arranged with respect to the ribs a, a'.

As a result of this construction it becomes possible to change the location of the ribs a a' relative to the tie by simply reversing the tie plate so that the projections which before occupied the sockets or depressions nearest the end of the tie will occupy the sockets or depressions formed by the corresponding projections on the side most remote from the end of the tie, thus shifting the position of the ribs a a' nearer to or farther from the end of the tie without occasioning further mutilation of the tie such as would result if the projections were shifted and reseated in new sockets or depressions.

If the spike holes are symmetrically arranged also, the spikes may be made to occupy the same holes, but as this is not always desirable, especially where, by the enforced shifting of the tie plate, the sockets have been enlarged, I prefer to locate one spike hole nearer the end of the plate on one side than upon the other, so that, when the plate is reversed, the spikes can be driven into new wood instead of the old spike hole.

The dotted lines in Fig. 1 indicate the effect produced by reversing the plate.

In Figs. 4 and 5 the projections are shown arranged symmetrically on opposite sides of the median line but at unequal distances therefrom so that when the plate is reversed the ribs, indicated by the dotted lines, will be shifted in position.

Having thus described my invention, what I claim as new is—

1. A tie plate provided on its under surface with a series of separate holding plates or projections radially arranged beneath the central portion of the plate; substantially as described.

2. A tie plate provided on its upper face with a retaining rib or ribs and on its lower face with two or more symmetrically arranged projections eccentrically disposed with reference to the holding rib; substantially as described.

3. A tie plate provided with parallel holding ribs on its upper surface, symmetrically arranged projections on its lower face located eccentrically, and spike holes arranged at relatively different distances from opposite ends of the plate; substantially as described.

ROBERT MORRELL.

Witnesses:
F. W. GRAVE,
ROBERT L. MORRELL.

1 & 1962

EXHIBIT S39.

KATE S. HOLMES,
Notary Public.

1254

(No Model.)

J. T. STEWART.

RAILWAY TIE PLATE.

No. 535,963. Patented Mar. 19, 1895.

FIG. 1.

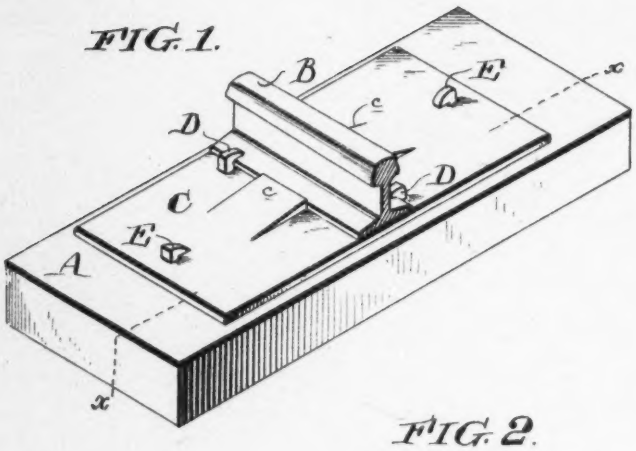


FIG. 2.

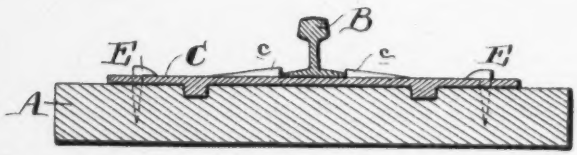


FIG. 3.

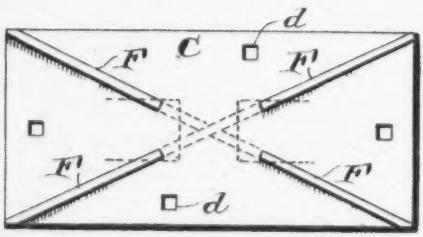


FIG. 4.

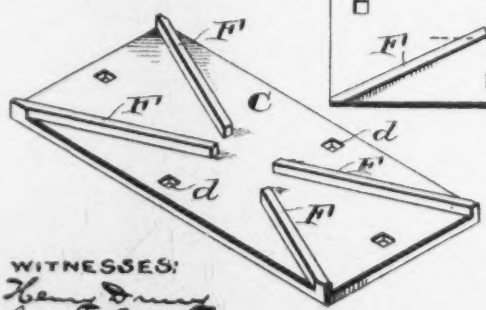
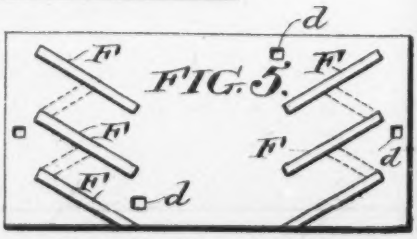


FIG. 5.



WITNESSES:

Henry Dewey

Geo. B. Bauer.

INVENTOR:

James T. Stewart

By Lindsley & Mitchell

UNITED STATES PATENT OFFICE.

JAMES T. STEWART, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE SHOULDER TIE PLATE COMPANY, OF NEW JERSEY.

RAILWAY-TIE PLATE.

SPECIFICATION forming part of Letters Patent No. 535,963, dated March 19, 1895.

Application filed July 11, 1892. Serial No. 439,625. (No model.)

To all whom it may concern:

Be it known that I, JAMES T. STEWART, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Railway-Tie Plates, of which the following is a specification.

My invention relates to railway tie plates and consists of certain improvements which are fully set forth in the following specification and are shown in the accompanying drawings, which form a part thereof.

More particularly my invention relates to metallic tie plates which are designed to be arranged between the wooden ties and the rail to relieve the wooden ties of the wear due to the direct action of the rail upon them. Such plates may also serve to brace rails and hold them in place and to relieve the strain from the rail spikes. In tie plates of this kind the great strain upon the central or rail bearing portion due to the downward pressure of the rails from the passage of railway trains tends to cause the outer portions which extend beyond the rail to bend or turn upward; and my invention is designed to overcome this defect by strengthening the plate at these parts by means of diagonal ribs which may be formed upon the under surface of the plate and may be driven into the wood of the tie so as to more firmly hold the plate in place and relieve the fastening spikes of strain.

The particular construction of the tie plate in other respects is not material to my invention. In the accompanying drawings, however, for purposes of illustration I have shown a tie plate of the general construction shown in Letters Patent of the United States to Louis Blackstone No. 413,609, dated October 22, 1889.

In the drawings:—Figure 1 is a perspective view of a portion of a railway tie, rail and tie plate. Fig. 2 is a transverse sectional view of the same on the line x—x of Fig. 1. Fig. 3 is an inverted plan view of a tie plate embodying my invention. Fig. 4 is a perspective view of the same with the plate inverted; and Fig. 5 is an inverted plan view of a tie plate illustrating a modification of the invention.

A is the wooden tie.

B is the rail.

C is the tie plate which may have upon its upper surface one or more brace pieces adapted to bear against the flange of the rail to receive the side thrust. These brace pieces c may be arranged upon either or both sides.

D are rail spikes which may be driven into the tie through slightly offset spike holes d so as to relieve the spikes of side thrust.

E are fastening spikes for securing the plate C to the tie.

F are ribs upon the tie plate extending diagonally across the portion of the plate which extends beyond the part which receives the rail base. These diagonal ribs may be continued entirely across the plate as shown in dotted lines in Fig. 3, but their presence under the part which receives the rail base is not necessary. I prefer to arrange these ribs F as shown in Fig. 4 upon the under side of the plate running from the corners toward the center. A different arrangement is shown in Fig. 5.

The number of diagonal ribs employed is not essential. One or more may be used. The diagonal arrangement of the ribs serves to strengthen the plate throughout and effectively prevents the turning up or bending of the sides. As the ribs extend diagonally it will be seen that they brace the plate both longitudinally and transversely, not only preventing the bending of the sides in a longitudinal direction, but also preventing the turning up of the corners of the plate. The plate is thus preferably braced with a minimum expenditure of metal for the purpose. By employing these ribs it is possible to employ much lighter plates than could otherwise be used so that a great saving of metal is obtained.

When the ribs are located upon the under side of the plate they may be buried in the wood of the tie as is shown in Fig. 2, thus serving also to hold the plate in place and relieve the strain upon the fastening spikes E.

While I prefer the minor details of construction shown I do not mean to limit myself to them as it is apparent that they may be varied without departing from the invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. A railway tie wear plate adapted to receive the rail base provided upon its under

surface with a diagonal strengthening rib extending diagonally beyond the portion which receives the rail base up to the outer edge of the plate.

2. A railway tie wear plate adapted to receive the rail base provided upon its under surface on each side with a diagonal strengthening rib extending diagonally beyond the portion which receives the rail base up to the outer edges of the plate on each side.

3. A railway tie wear plate adapted to receive the rail base having its under surface provided upon each side with ribs extending diagonally across the plate on either side beyond the rail spike holes.

4. A railway tie wear plate adapted to receive the rail base having its under surface provided upon each side with a series of oppositely arranged ribs extending diagonally across that portion of the plate on either side beyond the part which receives the rail base and extending beyond the rail spike holes and substantially up to the corners of the plate.

In testimony of which invention I have hereunto set my hand.

JAMES T. STEWART.

Witnesses:
ERNEST HOWARD HUNTER,
S. T. YERKES.

7 & 1968

EXHIBIT S40.

KATE S. HOLMES,
Notary Public.

1258

(No Model.)

B. WOLHAUPTER.

TIE PLATE.

No. 538,808. Patented May 7, 1895.

Fig. 1.

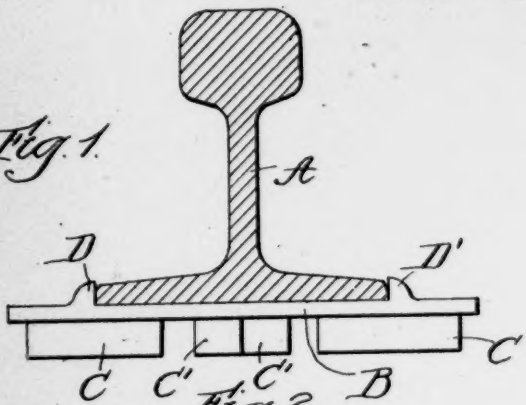


Fig. 2.

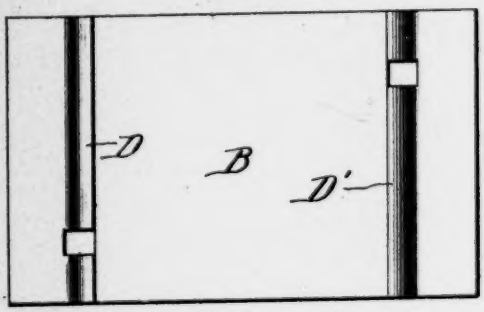
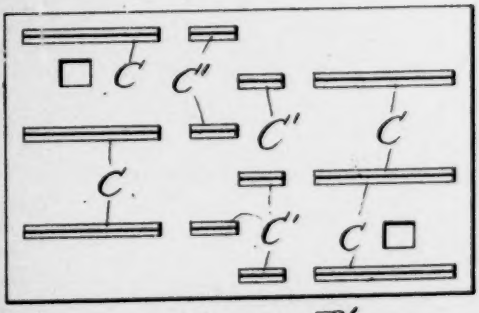
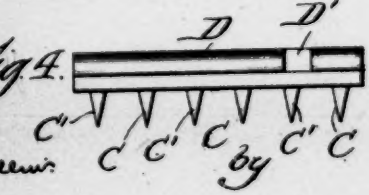


Fig. 3.



Witnesses
Wm. F. Fleming
Wm. N. Rheem

Fig. 4.



by

Inventor
Benjamin Wolhaupter
By Walter H. Chamberlin
Atty.

UNITED STATES PATENT OFFICE.

BENJAMIN WOLHAUPTER, OF MORGAN PARK, ILLINOIS.

TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 538,808, dated May 7, 1895.

Application filed November 23, 1894. Serial No. 529,690. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN WOLHAUPTER, a subject of the Queen of Great Britain, residing at Morgan Park, county of Cook, State of Illinois, have invented a certain new and useful Improvement in Tie-Plates; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its object the production of a railway tie plate of that class in which the engaging devices on the under side of the plate which enter the tie extend parallel with the grain of the tie.

The invention relates more particularly to that style of plate shown in my pending application for railway tie plate filed March 10, 1894, Serial No. 503,111.

The invention consists in a combination of devices and appliances hereinafter described and claimed.

In the drawings, Figure 1 is a cross-section of a railway-rail, showing an edge elevation of my plate. Fig. 2 is a plan view; Fig. 3, a view of the under side of the plate, and Fig. 4 an end elevation thereof.

In carrying out the invention E represents the rail and B the body of my plate. On the under side of the plate as shown in Fig. 3 is a series of divided ridges C, C'. It will be observed that these divided ridges are staggered, that is to say, they are not in longitudinal alignment with each other. On the upper side of the plate are flanges D, D', forming rail abutting flanges to prevent lateral movement of the rail upon the plate itself.

By the above construction it will be observed that I have obtained a maximum efficiency for the plate against a creeping of the plate longitudinally of the tie, while at the same time I have provided the plate with the transverse top ridges D, D' to prevent absolutely lateral movement of the rail upon the plate. The particular form of the flanges on the under side of the plate being divided (into the portions C, C') and at the same time staggered as shown gains for the plate that essential quality of being able to resist the lateral thrusts of the rail while at the same time the advantageous features of having the engaging devices parallel with the grain of the wood of the tie are retained.

The advantages of this style of construction are more particularly set forth in my above named application, and I would have it understood that I do not herein broadly claim elongated divided ridges on the under side nor elongated divided ridges in combination with rail abutting flanges on the upper side since the claims of my above named application broadly cover these features, but

What I claim is—

1. A railway tie plate provided on its under side with a series of elongated divided ridges inside the outer edges of the plate and extending when in position on the tie parallel with the grain thereof, and on its upper side with one or more rail abutting flanges extending substantially parallel with the rail flange, substantially as described.

2. A railway tie plate provided on its under side with a series of elongated divided ridges extending when in position on the tie parallel with the grain thereof, said ridges being out of longitudinal alignment with each other, and each ridge being out of transverse alignment with the ridge next adjacent, whereby said ridges are arranged in a zigzag or staggered form and the plate provided on its upper side with one or more rail abutting flanges, substantially as described.

3. A railway tie plate provided on its under side with a series of elongated, divided, staggered ridges extending when in position on the tie parallel with the grain thereof, and on its upper side with one or more rail abutting flanges extending substantially parallel with the rail flange, substantially as described.

4. A railway tie plate provided on its under side with a series of elongated ridges inside the outer edges of the plate and extending when in position on the tie parallel with the grain thereof, and on its upper side with one or more rail abutting flanges extending above and across the under flanges and substantially parallel with the rail flange, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

BENJAMIN WOLHAUPTER.

Witnesses:

W. H. CHAMBERLIN,

FLORENCE KING.

(No Model.)

W. H. CHAMBERLIN.

TIE PLATE.

No. 538,817. Patented May 7, 1895.

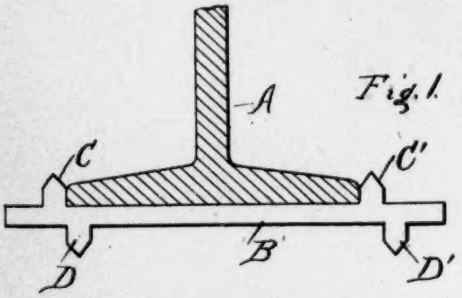


Fig. 1.

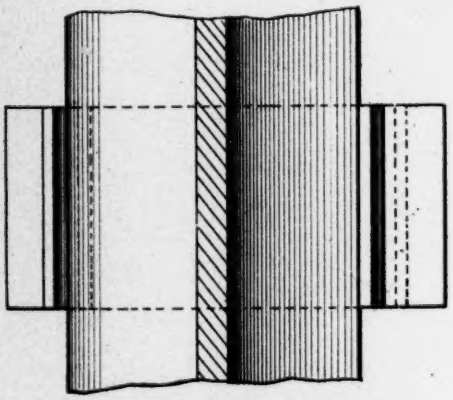


Fig. 2.

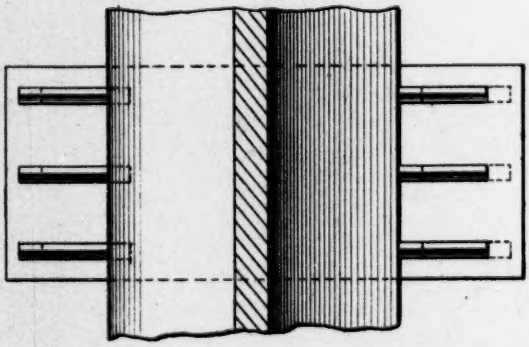


Fig. 3.

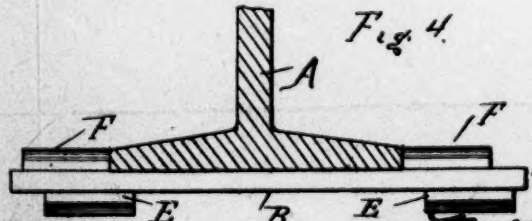


Fig. 4.

Witnesses.
Wm. M. Rheem.
Geo. R. Sanders.

Inventor.
Walter H. Chamberlin.

UNITED STATES PATENT OFFICE.

WALTER H. CHAMBERLIN, OF CHICAGO, ILLINOIS.

TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 538,817, dated May 7, 1895.

Application filed March 13, 1895. Serial No. 541,563. (No model.)

To all whom it may concern:

Be it known that I, WALTER H. CHAMBERLIN, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented a certain new and useful Improvement in Tie Plates; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its object the production of a railway tie plate which shall be adjustable along the tie, for the purpose of returning the track rail to its normal gage after the rail has by the repeated thrusts of the passing train forced the tie plate out of its original and normal position on the tie, and this permits the rail to also move from its normal or original position. It is of course obvious that if the plate moves or creeps along the tie the tie engaging devices will compress the fiber in advance of them so that after the plate has once shifted, or shifted a short distance, it takes much more pressure or a much longer time to again shift it the same distance.

My invention has for its object the production of a plate which shall be so formed that after the tie engaging devices have formed orifices or indentations in the tie and by a lateral or shifting movement have compressed the fiber of the tie adjacent to these orifices, the plate by reversing its position and placing the face of the plate originally on the tie upward to receive the rail while the side originally forming the rail seat is made the tie face, will so shift the relative location of the rail engaging devices as that the rail will be brought back to its original or normal position.

The details of the construction of the plate will be hereinafter more fully described and claimed.

In the drawings, Figure 1 is a vertical section through a portion of a rail, showing an ...ge elevation of my tie-plate. Fig. 2 is a ... view. Fig. 3 is a plan view of a varia... Fig. 4 is an edge elevation of a varia...

...n carrying out the invention A represents ... rail and B the plate.

..., C' are rail engaging flanges on the upper side of the plate extending substantially parallel with each other, the rail being placed between them.

D, D' are tie engaging flanges on the under side of the plate extending substantially parallel with each other, the flanges on the upper and lower sides being substantially duplicates of each other, that is to say, substantially the same shape. It will be observed, however, that the flanges on the under side are not in the same vertical plane as the flanges on the upper side, the result being that if the plate is turned upside down on the tie the rail will not be in the same relative position when placed between the rail engaging flanges as it was before the reversal of the position of the plate. It will thus be observed that the distance between the vertical plane of the two sets of flanges—that is, the set on one side of the plate, and the set on the other side of the plate—will be the measure of adjustment of which the plate is capable

In Figs. 3 and 4 I have shown a construction in which the tie engaging flanges extend parallel with the grain of the tie instead of across the grain as in Figs. 1 and 2. E represents the tie engaging flanges while F represents the rail engaging flanges, the set E being duplicates of the set F so far as size, shape, distance apart, &c., are concerned, the set E being not in the same vertical plane as the set F and therefore when the plate is turned upside down the rail seat will not be in the same vertical plane as it was before the plate was turned upside down.

It is obvious of course that many different forms of tie engaging and rail engaging devices may be provided without departing from the spirit of my invention which consists essentially in making the upper side of the plate substantially a duplicate of the lower side of the plate, the devices on the respective sides being out of the same vertical plane.

What I claim is—

1. A railway tie plate provided on its under side with a tie engaging device or devices, and on its upper side with a rail engaging device or devices, the device or devices on the respective sides being substantially duplicates of each other, but out of the same vertical plane, substantially as described.

2. A tie plate provided on its under side

with tie engaging flanges and on its upper side with rail engaging flanges, the flanges on the under side being substantially duplicates of those on the upper side but out of the same vertical plane with each other, substantially as described.

3. A railway tie plate provided on its under side with flanges extending across the grain of the tie, substantially parallel with each other and on its upper side with flanges extending parallel with the rail and substantially parallel with each other, the flanges on the under side being substantially the same shape as the flanges on the upper side, but not in the same vertical plane, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

WALTER H. CHAMBERLIN.

Witnesses:

FREDERIC S. WHEATON,

FLORENCE EMBREY.

79 & 1980

EXHIBIT S42.

KATE S. HOLMES,
Notary Public.

1265

(No Model.)

W. GOLDIE.

TIE PLATE.

No. 540,356. Patented June 4, 1895.

Fig. 1.

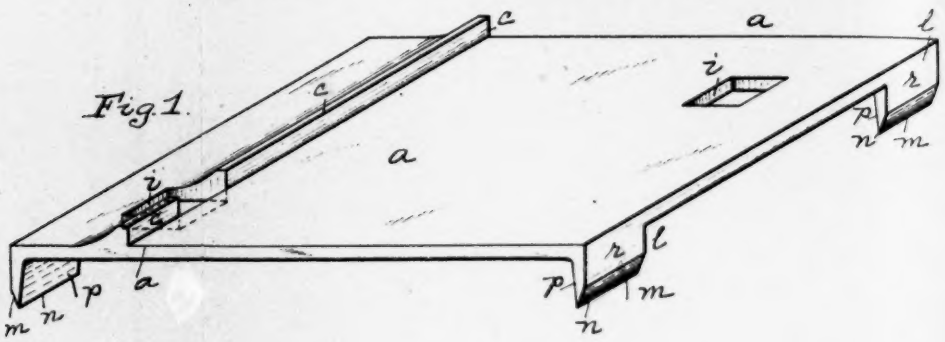


Fig. 2.

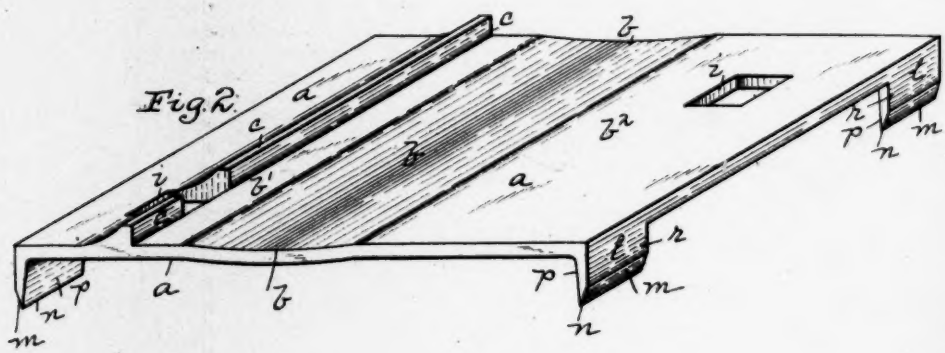
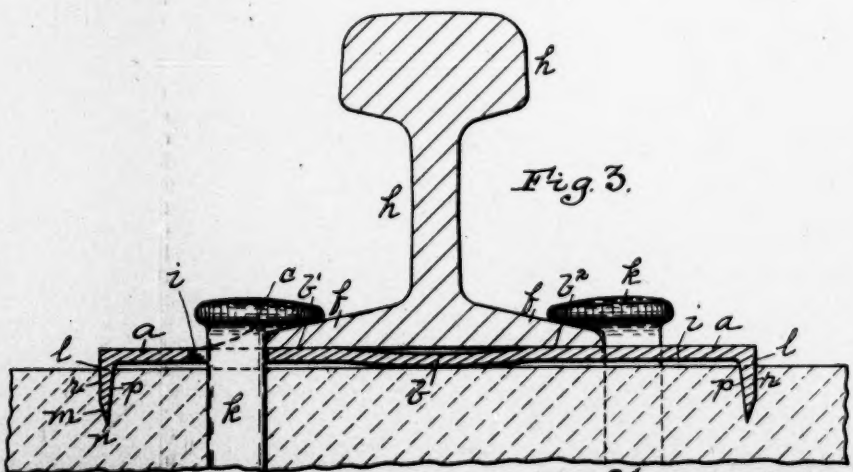


Fig. 3.



Witnesses:
J. C. Kay.
J. L. H. Hulbert.

Inventor:
William Goldie.
By Kay Tatton & Cooke
Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM GOLDIE, OF WILKINSBURG, PENNSYLVANIA.

TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 540,356, dated June 4, 1895.

Application filed February 17, 1894. Serial No. 500,485. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GOLDIE, a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Tie-Plates; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to tie-plates, that is, to the plates placed upon wooden railroad ties between the same and the base of the rail to take the wear of the rail, the plate in some cases having been used to sustain the lateral strain brought upon the rail when the train passes over the same, especially at curves and like places. It is now generally recognized among road masters or the engineers having charge of the maintenance of way on railroads that the ordinary railroad spike is inadequate to sustain the very heavy lateral strain brought upon the same by the heavy loads which modern railway practice demands, as it is this lateral strain and the chafing pressure of the rail upon the spike which loosens the spike and reduces its frictional hold upon the tie. This lateral pressure upon the spike causes the mechanical abrasion or wear of the tie, while the ordinary railroad tie is crushed or broken by the spike in driving, and the heavy loads now carried soon render the spike loose, so making liable the spreading of the rails and the disastrous accidents therefrom.

It has been recognized that tie-plates to support the rail upon the tie would largely overcome these difficulties, and such plates have been devised, among others, the plates shown in Patent No. 457,584, granted to me August 11, 1891, which provided a shoulder on the upper face of the plate against which the outer edge of the rail flange pressed, and had at the ends of the plate downwardly projecting triangular prongs or claws which were adapted to enter the tie and to cut the same across the grain thereof, and so obtain a hold upon the tie to resist the lateral strain; the spikes passing through this plate and engaging with the rail flange to hold the same firmly to the tie. While this plate embodied certain valuable improvements there were some difficulties encountered in connection with the same, among others, the fact that, as the prongs or claws were triangular, there was liability of rocking action when the plate was driven to its place by the trackmen, and therefore it was difficult to drive. It was also objectionable in the fact that the triangular prongs, though extending some distance down into and cutting the tie for that distance, did not take any great hold upon the body of the tie except near the top face thereof, as that was the only part of the triangular body which was sufficiently broad to offer great resistance to the strain brought upon the tie-plate. It was also difficult to form this plate by a rolling operation and to produce cutting edges on the triangular prongs which would be sufficiently sharp to cut the wooden fiber without crushing or breaking the same. Experience has demonstrated that any tie-plate, to be successful in use, must, when driven to place, adhere with sufficient force to render it substantially a part of the tie, so that in case of any movement of the rail it must occur between the rail and tie-plate and not between the tie-plate and the tie, as any movement between the tie-plate and the tie results in mechanical abrasion and cutting of the tie as badly as if no plate were used.

The tie-plate forming the subject matter of this application overcomes the objections heretofore found in these plates, and fulfills the requirements of an efficient plate.

It consists, generally stated, in a tie-plate having a body portion provided on its upper surface with a rib to support or receive the thrust of the rail, and having at intervals at its edges downwardly projecting square claws extending parallel with the body of the plate and having the edges thereof beveled to form sharp, chisel cutting edges for the entire widths of the claws; so that when the plate is driven to place the sharp, chisel cutting edges will rest on the flat surface of the tie, providing for the easy adjustment of the same against the rail, and on account of their long chisel cutting edges parallel with the body portion they will drive properly into the tie, will cut the same cleanly, will sufficiently wedge out the wood fiber to obtain a strong hold of the claws upon the tie, and provide a broad surface for the full width of the claws, extending down for the full distance that the tie is cut by the claws, so obtaining as broad bearing surfaces to resist lateral thrust on the

tie-plate at the bases of the claws as at the top thereof, and giving such adhesion that the plate becomes practically part of the tie, so that the wooden tie, when thus equipped, is as efficient for the preservation of gage as a metallic tie, while retaining the elasticity, cheapness, and other advantages of the wooden tie.

The particular points of invention desired to be covered will be hereinafter more particularly set forth and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figures 1 and 2 are perspective views of tie-plates embodying my invention. Fig. 3 is a sectional view of the same, showing the tie-plate on the tie and the rail resting and spiked down thereon.

Like letters of reference indicate like parts in each view.

The tie-plate illustrated has the body portion *a*, which may either be flat throughout as shown in Fig. 1, or which is depressed in the center thereof where the rail flange rests, as at *b*, as described in Patent No. 485,030, granted to me October 25, 1892, to prevent buckling of the plate. The plate has on one side of the upper surface thereof the rib *c*, against which the edge of the rail flange *f* rests, by which the outward, spreading, or lateral strain on the rail *h* is sustained by the tie-plate. At suitable points in the body of the plate are the spike holes *i* through which the spikes *k* are driven, their heads extending over the rail flanges *f*. Projecting down from the body *a* of the plate at intervals on the outer or side edges thereof are the claws *l*, to which this invention more particularly relates. These claws are formed parallel to the length of the rail so that they will enter the tie in such position as to sustain the tie-plate against the lateral or spreading strain brought upon the rail by the passing train. They are formed at intervals on the plate so that there will be no greater cutting of the tie by the use of the tie-plate than is necessary to obtain a firm hold on the tie, it being preferred that the plate shall have one such claw at each corner thereof, though such claws may be employed between the ends, such, for example, as in long plates employed on ties where two rails meet, in which one or more claws may be employed between the ends of the plate. These claws *l* are square, or, as it may be termed, rectangular in surface or area, being as wide at the bases as at the upper ends thereof, and the lower edges thereof are beveled to form sharp, chisel cutting edges for the entire width of the claws, so that the plate is provided with a series of claws having such sharp cutting edges that they will sever the fiber of the tie without crushing the same, and will by the beveled faces *m* forming the cutting edges *n* compress such fiber sufficiently to obtain a strong frictional hold thereon, the fiber being forced back by the beveled face so that it bears directly on the body of the square claw and gives great frictional hold of the claw upon the tie, while, as the claw is of the same width throughout its entire length, or for the depth to which it enters into the tie, a strong hold is obtained upon the tie for the full depth of the claw, it being found that by this special construction of the claws the hold of the tie-plate upon the tie is increased largely over triangular claws. It will be noticed that the body portions of these claws are slightly tapering, the drawings showing the inner face *p* of the claw tapering from the body portion *a* to the cutting edge *n*, while the outer face *r* of the tie-plate above the beveled face *m* is at right angles to the body portion. I prefer this construction of the claw, and prefer to form the beveled face *m* which provides the cutting edge *n* on the outer face, because the tapering inner face tends to compress the wood fiber cut, while the tapering bevel *m* has the same action, and, as the claw is not of any great thickness, compression of the wood fiber can be obtained without the crushing of the same, and the compressed body of the wood fiber bears against the straight or perpendicular face *r* of the claw above the bevel *m*, the combined action of the inner tapering face, the sharp chisel cutting edge, the bevel on the outer face, and the straight or perpendicular portion above the same giving an exceedingly strong hold of the claws upon the body of the tie. In this way, without cutting any great portion of the wooden tie, I obtain so strong an adherence of the plate upon the tie that the plate becomes substantially part of the tie, and any movement of the rail upon the tie necessarily occurs between the rail and tie-plate, and the wooden tie is entirely protected from mechanical abrasion by the rail.

It is, of course, to be understood that while I prefer the construction above described, the claw may have its bevel on the inner face with a straight face above the same and the outer face slightly tapering, practically the same result being obtained.

In the use of the plate, after the rail has been extended over the ties and properly gaged, the tie-plate is slipped under the rail and the rib *c* brought against the edge of the outer flange *f* thereof, so bringing the plate to the exact position desired. The tie-plate then rests upon the tie, the four broad chisel cutting edges of the claws giving a broad bearing on the tie. When the plate is driven into the tie the blows of the maul act upon a plate having wide cutting edges, and the rocking action found where triangular claws were employed does not occur, the plate being driven solidly to place by a few sharp blows. As it is driven to place the lower cutting edges of the upper claws cut the course for the same for the full width of the claws, and the fibers so cut are sufficiently compressed to give the firm frictional hold of the claws upon the tie above described. The rail is then spiked to

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the tie, the spikes passing through the spike holes *i* in the usual way.

When in use the lateral strain brought upon the rail is transferred from the same through the rib *c* to the tie-plate, but as that plate is held firmly down by the spikes and the rail resting on it, as well as the weight of the passing train, the claws *l* give a strong support to the plate against such lateral strain, offering the resistance of their broad faces extending for the full depth of the claws into the body of the tie and efficiently resisting such lateral strain, as has been practically and successfully tested, the plate having been shown to resist a greater lateral strain than any other plate upon the market. At the same time, as all lateral strain is removed from the spikes themselves, and they are only required to hold against the vertical strain upon the rail, they offer a much stronger resistance to such vertical strain because relieved from the chafing action of the rail thereon, and their hold upon the tie is increased in duration as well as strength, as lateral pressure of the spikes upon the wood fiber is entirely prevented. For these reasons a very efficient tie-plate is thus provided.

I prefer to form the plate with the slight longitudinal depression extending under the rail as at *b*, Fig. 2, in which case the rail rests on the flat faces b' b^2 on each side of the depression, and in case the lower surface of the rail is slightly rounding, prevents the buckling of the plate by the pressure directly under the rail-web, which has a tendency to buckle the plate and raise the outer edges thereof, as described in said Patent No. 485,030, granted to me October 5, 1892. Such depression also performs another special function when employed with a tie-plate having claws parallel with the rail and at the outer edges of the plate or beyond the tread or bearing point of the rail body. In that case the pressure caused by the weight of the load on the rail on each side of the depression, which bears on the tie, acts by leverage from the depression as a fulcrum to force the claws into the tie, and hold them firmly to place while the load is passing over the rail, so insuring a firm hold of the tie-plate to the tie just at the time that the strain is brought thereon.

The tie-plate can be rapidly and cheaply formed by rolling the same with the rib and with continuous flanges along the outer edges thereof; cutting the plates to length, punching out the metal between the claws; and then shearing the edges of the claws obliquely and in the direction of their length so as to form the cutting edges; this forming the subject matter of a separate application of even date herewith.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A tie-plate having a body portion provided at intervals at its edges with downwardly projecting square claws extending parallel with the rail, and having the lower edges thereof beveled to form sharp chisel cutting edges for the full width of the claws, substantially as set forth.

2. A tie-plate having a body portion provided at intervals at its edges with downwardly projecting square claws extending parallel with the rail and having tapering bodies, and having the edges thereof beveled to form sharp chisel cutting edges for the full width of the claws, substantially as set forth.

3. A tie-plate having a body portion provided at intervals at its edges with downwardly projecting square claws extending parallel with the rail and having tapering bodies, and having the edges thereof beveled on the outer surfaces to form sharp chisel cutting edges for the width of the claws, substantially as set forth.

4. A tie-plate having a body portion provided at intervals at its edges with downwardly projecting square claws having the inner faces thereof tapering for the full length, and having the outer faces at right angles to the upper face of the body portion, and provided with bevels at the base thereof to form sharp chisel cutting edges for the full width of the claws, substantially as set forth.

5. A tie-plate having a body portion having a slight depression under the rail tread, and provided at intervals beyond the tread of the rail with claws extending parallel with the rail, substantially as set forth.

In testimony whereof I, the said WILLIAM GOLDIE, have hereunto set my hand.

WILLIAM GOLDIE.

Witnesses:
L. H. KNOX,
J. N. COOKE.

1270

(No Model.)

B. REECE.

RAILROAD TIE PLATE.

No. 541,984. Patented July 2, 1895.

Fig. 1.

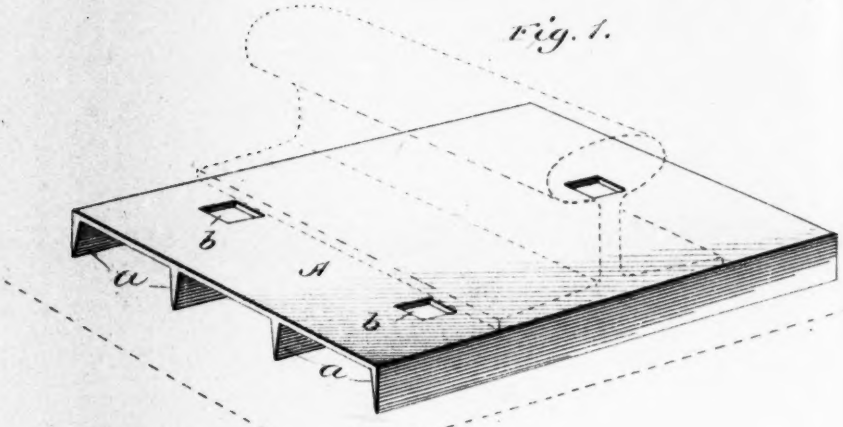


Fig. 2.

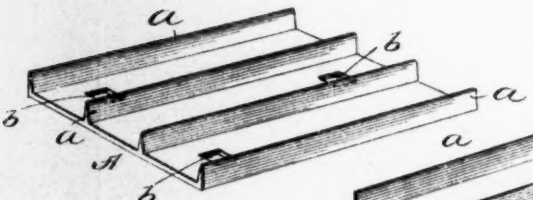


Fig. 3.

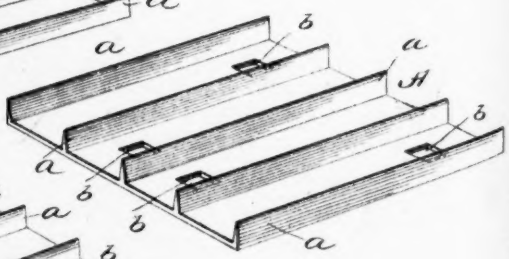
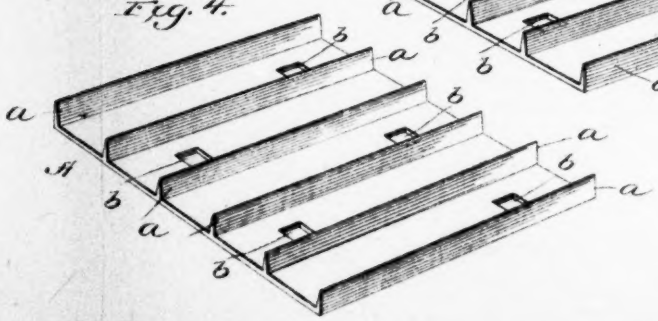


Fig. 4.



Witnesses:
Harry E. Palmer.
Wm. E. Dyre.

Inventor:
Benjamin Reece
by F. W. Ritter Jr.
Atty.

1271

UNITED STATES PATENT OFFICE.

BENJAMIN REECE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE Q AND C COMPANY, OF SAME PLACE.

RAILROAD-TIE PLATE.

SPECIFICATION forming part of Letters Patent No. 541,984, dated July 2, 1895.

Application filed March 23, 1895. Serial No. 542,960. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN REECE, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Railroad-Tie Plates; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a top perspective view of a tie-plate embodying my invention, the position of the tie and rail indicated in dotted lines. Fig. 2 is a bottom perspective view of the tie-plate shown in Fig. 1 reduced. Figs. 3 and 4 are reduced bottom perspective views of modifications.

My present invention relates to certain improvements in that class of tie-plates wherein the tie-plate is provided on its under surface with a series of longitudinal flanges or ribs which enter the tie parallel with the grain or fiber of the wood to avoid tearing the fiber, which flanges also truss or stiffen the plate transversely of the rail-seat to counteract any tendency of the plate to buckle under the load and tread of the car-wheel.

The object of the present invention is to prevent or obviate the tendency of the tie to check or split when a number of spike-holes are required and used, and also to avoid the weakening of the plate and liability to buckle, incident to increased loss of material, when a plurality of spike-holes are formed on the same side of the rail-seat. In the laying of tracks experience has shown that, owing to the side thrust of the load and the cone of the wheel, the force is exerted in oblique or radial lines, the resultant of which is along a line taken from spike-hole to spike-hole on the outer edge of the foot of the rail, and that while a spike is desirable, if not necessary, on the inner side of the rail the number that secure the outer edge of the rail should be at least two. To so locate spike-holes in trussed tie-plates as at present constructed, two spike-holes, if for opposite sides of the rail must be placed substantially in line, which when the are driven in laying the track tends to ee checking or splitting of the tie in the ne of the spikes, and the consequent more or less rapid destruction of the tie. If, on the contrary, the spike-holes are staggered or alternated, it results in bringing two spikes adjacent and within two reinforce or truss ribs, so that not only is the holding power of the spikes diminished, but the loss of material in the tie-plate induces a tendency to buckle at this point. Again, if the truss-ribs or reinforce-flanges are not continuous the tie-plate will give down or buckle in the line of least resistance. In order to overcome these several difficulties and disadvantages, I construct the tie-plate with a plurality of continuous ribs or flanges, not less than four, whereby the spike-holes of the plate may be staggered or alternated, the spike-holes of the same side being separated by ribs and the outer spike-holes bounded by flanges or ribs, and such a construction or its equivalent embodies my present invention.

I will now proceed to describe my invention more fully, so that others skilled in the art to which it appertains may apply the same.

In the drawings, A indicates the tie-plate, the upper or rail surface of which is preferably plain, the plate itself being of light wrought metal, preferably produced by rolling, and of such thickness as will preserve and utilize the resiliency of the tie. Upon the under surface of such plate I produce a series of not less than four (4) longitudinal continuous ribs or flanges *a a a a* at such intervals or such distance apart as will at least permit of the punching or otherwise forming the spike-holes *b b b* along or near to the opposite boundary-lines of the rail-seat in such manner that at least one continuous rib or flange *a* shall intervene or be interposed between each two spike-holes of the same side, and a continuous flange or rib *a* shall also sustain the plate on a line to the outside of the extreme outer spike-holes, so that the series of spike-holes are included between the two outer flanges *a a*, and the intermediate flanges *a a* separate or divide the spike-holes, thus insuring a reinforcing of the plate on the line parallel with the outer edge of the foot-flange of the rail or line of resultant force and obviating any tendency of the plate to buckle from loss of substance.

The number of flanges or truss-ribs may be increased at will, and will be increased pro-

1272

portionately with the number of spikes used in the outer side of the rail, as indicated in Figs. 3 and 4 of the drawings.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

A railroad tie-plate having a plurality of spike holes on one side of the rail seat, the spike holes on opposite sides of the rail seat staggered or dodged, and on one side of the plate a plurality of continuous flanges or ribs, not less than four, which ribs or flanges separate the inner spike holes and include the outer spike holes; substantially as and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 22d day of March, 1895.

BENJAMIN REECE.

Witnesses:
H. M. STERLING,
WM. E. DYRE.

993 & 1994

EXHIBIT S44.

KATE S. HOLMES,
Notary Public.

1274

(No Model.)

C. F. QUINCY.

COMBINED TIE PLATE AND RAIL BRACE.

No. 542,352. Patented July 9, 1895.

Fig. 1

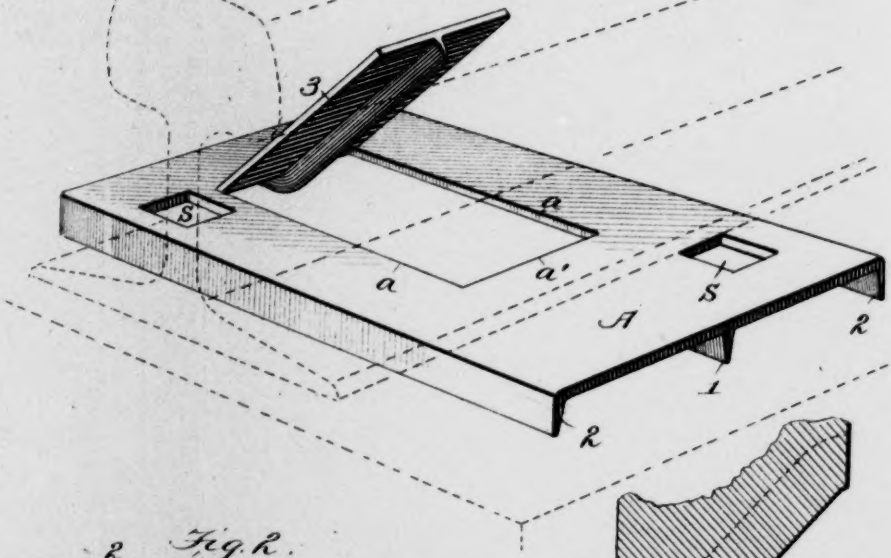


Fig. 2.

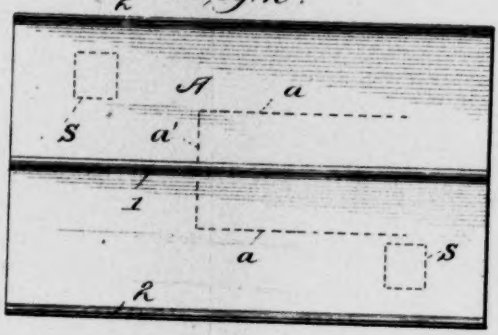


Fig. 3

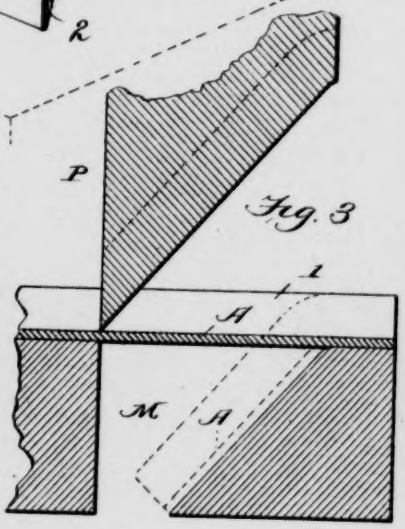
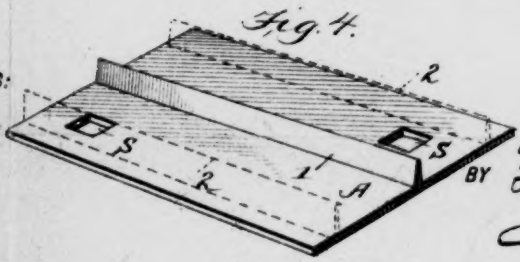


Fig. 4.



WITNESSES:

Edwin L. Bradford

M. Darley

INVENTOR

Charles F. Quincy

BY F. W. Ritter Jr.

ATTORNEY.

POOR COPY

UNITED STATES PATENT OFFICE.

CHARLES F. QUINCY, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE SERVIS RAILROAD TIE-PLATE COMPANY, OF NEW YORK, N. Y.

COMBINED TIE-PLATE AND RAIL-BRACE.

SPECIFICATION forming part of Letters Patent No. 542,352, dated July 9, 1895.

Application filed March 6, 1895. Serial No. 540,772. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. QUINCY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in a Combined Tie-Plate and Rail-Brace; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of a combined tie-plate and rail-brace embodying my invention, portions of the tie and rail being shown in dotted line. Fig. 2 represents a portion of a longitudinally ribbed bar which may be employed in manufacturing said combined tie-plate and rail-brace. Fig. 3 is a vertical transverse section of a matrix and drop die or punch which may be employed in manufacturing said combined tie-plate and rail-brace. Fig. 4 is a view of a modified form of bar which may be utilized in making such combined tie-plate and rail-brace.

Like symbols refer to like parts wherever they occur.

As is now well understood in railway practice, in order to economically maintain the "way," a tie-plate should be employed to protect the tie and prevent the rapid wear, destruction, and decay thereof by the vibration of the rail under the passage of loaded wheels; that said tie-plate should be of a character to utilize the resiliency of the tie and prevent hammering of the rail, and, further, that the tie-plate should also be provided on its upper surface with some means of sustaining or supporting the rail against the lateral thrust of the passing wheel. To meet these several requirements, it has been found desirable to employ light wrought-metal plates and stiffen or truss both tie-plate and rail brace by ribs.

The object of the present invention, therefore, is the production of a combined tie-plate and rail-brace of a form that can be readily and economically manufactured, will be light, strong, and resilient, and will afford an efficient lateral support to both the foot-flange and web or head of the rail.

To this end one feature of my invention embraces a combined tie-plate and rail-brace having truss-ribs upon the under surface of both plate and brace, and another feature embraces the formation of free end of the ribbed rail-brace or that portion which bears upon the rail with a square face or on a line at right angles to the brace-rib, substantially as will hereinafter appear.

I will now proceed to describe my invention more specifically, so that others skilled in the art to which it appertains may apply the same.

In carrying out my invention I first produce, by means of rolls or dies, by forging, or in any of the several well-known ways of shaping wrought metal, a plate A or a bar—which is a multiple of the desired plate—said plate or bar having at least one rib 1, preferably centrally located and adapted to form the truss-rib of the rail-brace and lateral parallel ribs 2 2, adapted to form the truss-ribs of the tie-plate.

When the plate or bar is formed with a single central or intermediate truss-rib 1, the parallell truss-ribs of the plate may, if desired, be secured by bending the edges of the plate at right angles, as indicated by the dotted lines, Fig. 4.

Having obtained a wrought-metal plate provided with the said truss-rib 1, I cut the plate on lines *a a*, or parallel with the rib and equidistant therefrom, joining the said cuts by the transverse cut *a'*, or cut at substantially right angles to and across the rib, thus forming a tongue, which, upon being bent outward at an angle to the face of the plate, will constitute a rail-brace 3, provided with a truss-rib on its under surface and adapted by its square free end to take under the head of the rail and support the rail against the lateral thrust of the passing wheel.

The cutting or punching and setting up of the rail-brace 3 may be effected at a single operation by means of an anvil or matrix M and a drop die or punch P, and the spike-holes S S may be punched simultaneously or subsequently, as preferred.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A combined tie-plate and rail-brace hav-

ing truss-ribs upon the under surface of both plate and brace; substantially as and for the purposes specified.

2. A ribbed tie-plate, having a ribbed rail-brace of general rectangular form struck from the body of the plate; substantially as and for the purposes specified.

In testimony whereof I affix my signatu in presence of two witnesses, this 4th day March, 1895.

CHARLES F. QUINCY

Witnesses:
A. T. COLAS,
J. MELMER.

5-42,787

& 2000

EXHIBIT S45.

KATE S. HOLMES,
Notary Public.

1278

(No Model.)

B. WOLHAUPTER.

TIE PLATE.

No. 542,787. Patented July 16, 1895.

Fig. 1.

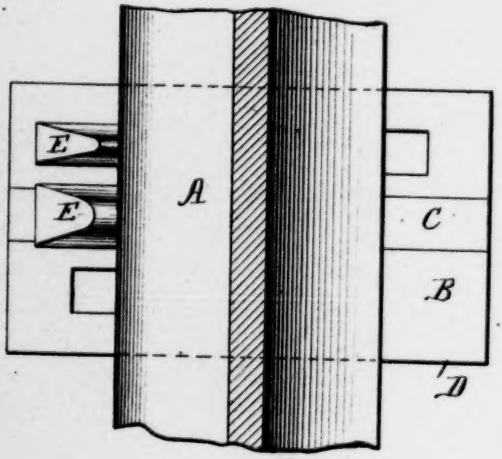


Fig. 2.

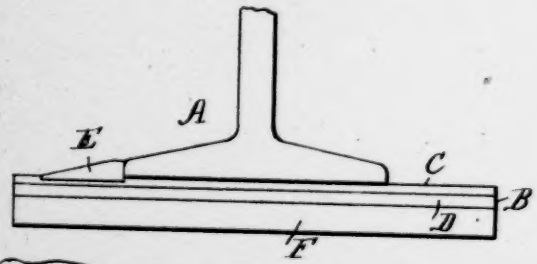


Fig. 3.

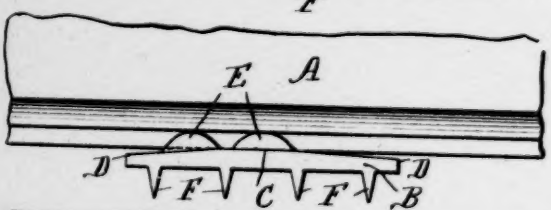


Fig. 4.

Fig. 5.

Witnesses.
Wm. M. Rheem.
Wm. T. Fleming

Inventor
Benjamin Wolhaupter
by Walter H. Chamberlain
Atty

UNITED STATES PATENT OFFICE.

BENJAMIN WOLHAUPTER, OF MORGAN PARK, ILLINOIS.

TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 542,787, dated July 16, 1895.

Application filed March 13, 1895. Serial No. 541,823. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN WOLHAUPTER, a subject of the Queen of Great Britain, residing at Morgan Park, county of Cook, State of Illinois, have invented a certain new and useful Improvement in Tie-Plates; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

Heretofore in the construction and use of railway tie-plates it has been customary to make the rail-seat on the upper side of the plate flat or level, so that, theoretically, the rail would be supported throughout the entire width of the plate; but the practical difficulty has been that the ties either had uneven surfaces on which the plates were laid or if the ties had dressed surfaces they would not always be laid so that their top surfaces were level, the result in either case being that the top surface of the tie, and consequently the rail-seat, was not level. This results in the rail bearing on one edge of the plate, and consequently to a greater or less extent on one edge of the tie. This causes what is known as "churning" of the tie—that is, a tilting movement of the tie in the ballast—soon loosening the tie in its bed. Again, the bearing of the rail on one edge of the plate causes that edge to embed itself more quickly in the tie and to tilt up the other edge of the plate, soon loosening the plate on the tie.

My invention relates to that class of plates one of which is placed on every tie between the rail and tie and forms a seat, not for two abutting ends of the rails, but for the rail at intervals throughout its length; and it has for its object the production of a plate which shall overcome the above-named difficulties by making the middle of the rail-seat higher than the edges that are transverse to the rail, so that whether the body of the plate is level or not the weight of the rail will be on this elevation and thus be distributed equally throughout the width of the plate.

Another feature of the invention is a peculiar formation of the tie-engaging devices, the entire construction being hereinafter more fully described and claimed.

In the drawings, Figure 1 is a plan view of the rail and my plate. Fig. 2 is a side elevation. Fig. 3 is an end elevation; Figs. 4 and 5, sectional views showing variations.

In carrying out the invention, A represents the rail, and B the plate. It will be observed that the rail-seat from one long end of the plate to the other, or, in other words, transversely of the rail, is made with the center C at a higher elevation than the edges D. Rail-abutting knobs or projections E may be provided on one or both sides of the rail. On the under side are the ridges or flanges F, extending parallel with the grain of the tie.

It is obvious that in the use of the above construction, whether the upper surface of the tie is level or not, (since the rail bears only at the middle,) the weight will be distributed throughout the width of the plate, thus causing it to be embedded into the tie equally. Again, this form of construction brings the thickest portion of the metal where there is the heaviest strain.

It is, of course, obvious that the construction might be modified in various ways and still be within my invention. For instance, the rail-seat might be made convex from side to side, as in Fig. 5, or there might be a rib extending across the rail-seat substantially at the middle, as in Fig. 4, the essential idea being to provide a plate which shall support the rail throughout the width of the rail and to reduce the bearing-surface in a direction longitudinally of the rail to a minimum for each plate.

I am aware that rail-joints have heretofore been constructed wherein that portion of the bed-piece on which the two abutting ends of the rails rested was at a higher elevation than that portion which extended to and rested on two adjacent ties, and such construction I do not claim.

What I claim is—

1. A railway tie plate having a middle portion of the rail seat higher than the edges

and a series of tie engaging flanges on the under side, the latter extending parallel with the grain of the tie, substantially as described.

2. A railway tie plate having a middle portion of the rail seat higher than those edges parallel with the tie, said raised portion extending throughout the width of the rail but forming a restricted bearing longitudinally of the rail and devices more or less sharpened on the under side of the plate f tering and engaging the tie, substantia described.

In testimony whereof I sign this spe tion in the presence of two witnesses.

BENJAMIN WOLHAUPT

Witnesses:

W. H. CHAMBERLIN,

FLORENCE EMBREY.

2005 & 2006

EXHIBIT S46.

KATE S. HOLMES,
Notary Public.

(No Model.)

T. S. WEED.

TIE GUARD OR PLATE.

No. 566,828. Patented Sept. 1, 1896.

Fig. 1.

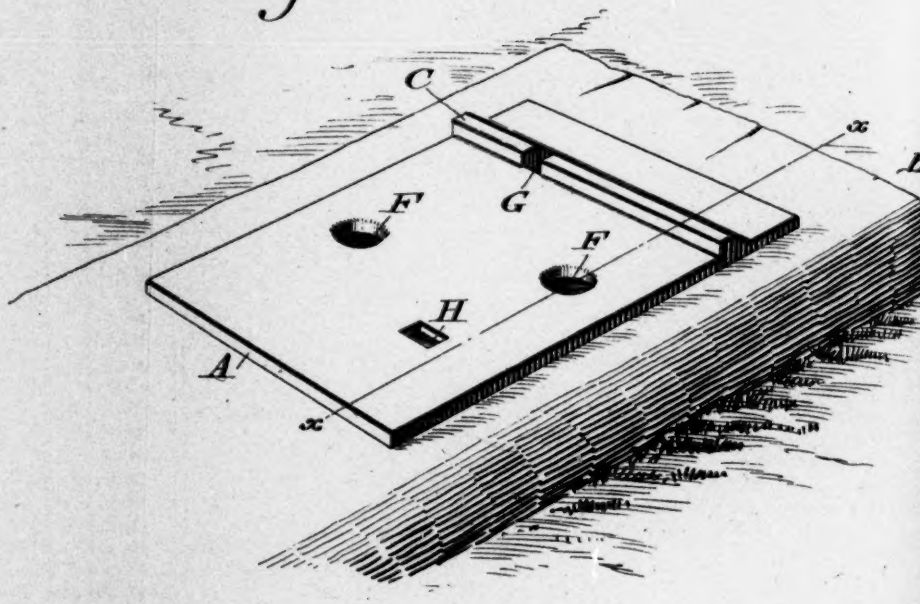
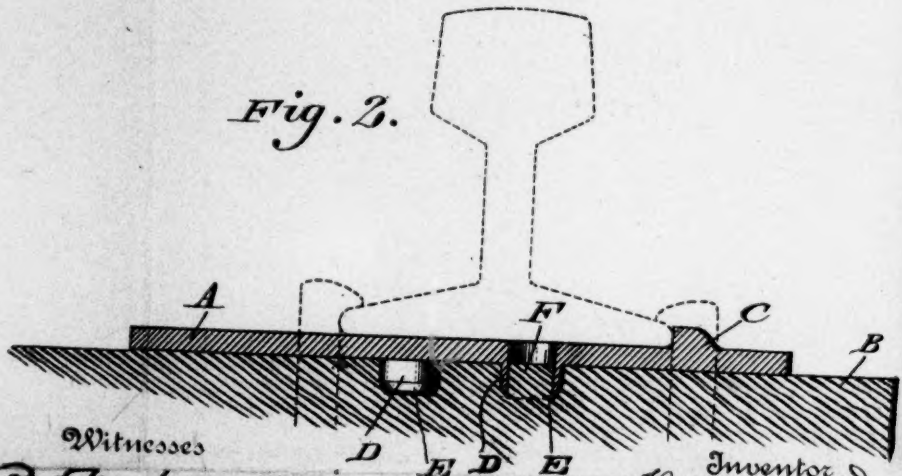


Fig. 2.



Witnesses
C. H. Hoyle.
L. Douville.

Inventor
Thaddeus S. Weed
By John A. Donnelly
Attorney

COPY BOUND

UNITED STATES PATENT OFFICE.

THADDEUS S. WEED, OF CHESTER, PENNSYLVANIA.

TIE GUARD OR PLATE.

SPECIFICATION forming part of Letters Patent No. 566,828, dated September 1, 1896.

Application filed March 19, 1896. Serial No. 542,312. (No model.)

To all whom it may concern:

Be it known that I, THADDEUS S. WEED, a citizen of the United States, residing at Chester, in the county of Delaware, State of Pennsylvania, have invented a new and useful Improvement in Tie Guards or Plates, which improvement is fully set forth in the following specification and accompanying drawings.

My invention consists of a novel construction of tie guard or plate, in which provision is made for causing a greater portion of the same than heretofore to be in contact with a tie, said plate being immovably held in position relative to the latter by the employment of suitable flanged sockets, which are of hollow tubular shape and project from the bottom of said plate and are adapted to enter said tie when the plate is secured thereto, whereby said sockets have points of contact and resistance within the tie, both on the inner and outer circumference, all as will be hereinafter set forth and claimed.

Figure 1 represents a perspective view of a tie guard or plate embodying my invention and a portion of a tie to which the same is applicable. Fig. 2 represents a section on line *x x*, Fig. 1.

Similar letters of reference indicate corresponding parts in the two figures.

Referring to the drawings, A designates a tie guard or plate, and B a portion of a tie adapted to sustain the same. The said plate has a transversely-extending ridge C on the top portion thereof, against which the base of a rail is adapted to contact, as seen in Fig. 2. D designates flanged sockets projecting from the bottom of said plate, said sockets being of hollow tubular shape and preferably punched and shaped by means of suitable dies and having their ends E sharpened, so that they may readily enter the tie, and since said sockets are hollow a core of wood F will extend up into each when they are in position, as will be understood from Fig. 2, the plate A thus being held immovably in place, especial emphasis being laid upon the fact that by reason of the extension of the core of wood into said socket the latter will have points of contact and resistance both on its inner and outer circumference, and the tie plate will therefore be positively held rigid with respect to the tie. G and H designate holes or slots in said plates through which the spikes pass, it being noticed that the hole G passes through the ridge C and that the hole H is preferably diagonally opposite thereto.

The operation is as follows: The plate having been placed on the tie, the flanged sockets D are caused to enter therein, and the core F projecting up into each socket, as indicated in Fig. 2, will cause said plate to be held in fixed position relative to the tie, as is evident, a greater portion of the latter than heretofore being in contact with the plate, and it will thus be seen that when a rail is placed on the latter and held in position by the spikes, as shown dotted in Fig. 2, all the parts will be rigid and immovable relatively to each other. The number of sockets may be increased or diminished according to requirements, two being shown in the present instance, although it is evident that three or more may be employed, if desired.

It will thus be apparent from the foregoing that a tie-guard constructed in accordance with my invention and having one or more flanged sockets turned downwardly and adapted to be embedded in the wood of a tie possesses more points of contact and more adhesion, and there is less liability of shifting than in plates having solid spurs or lugs, since the fiber of the wooden ties is less disturbed, and a very solid bearing of the tie is obtained on all points of the flanged socket on both its inner and outer circumference, and the wood of the tie being tightly inserted inside the sockets prevents lateral motion and forms a support not obtainable in the case of plates having solid spurs or lugs projecting therefrom. It will also be noticed that plates having flanged sockets, as above described, can be made from the same metal and weight as plain plates, thus saving the weight of spurs and lugs while securing all their advantages to a greater degree. It will further be evident that the flanged sockets above described can be attached to plates having either a plain or beveled surface, as desired, and that said sockets can be made of any reasonable length, diameter, or degree of sharpness,

CLOSE IN CENTER

and, further, that tie-guards provided with said sockets, when properly secured to wooden ties, will not absorb water or decay the wood to such a degree as plates having solid lugs or projections extending therefrom.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. As a new article of manufacture, a tie-plate having a tubular socket depending therefrom, said socket being open throughout, and having a cutting edge adapted to cut into a wooden tie, and thus receive the core of said tie, whereby any movement of said plate relative thereto is prevented, said socket having points of contact and resistance, both on its inner and outer circumference, substantially as described.

2. As a new article of manufacture, a tie-plate having a transversely-extending ridge on the upper side thereof, and provided with a depending tubular socket, the latter being open throughout, and having its lower end sharpened, whereby it is adapted to cut into a wooden tie, the core of the latter extending into said plate, whereby movement of the latter relative to said tie is prevented, substantially as described.

THADDEUS S. WEED.

Witnesses:

JOHN A. WIEDERSHEIM,

E. H. FAIRBANKS.

011 & 2012

EXHIBIT S47.

KATE S. HOLMES,
Notary Public.

1286

(No Model.)

M. SELLERS.

TIE PLATE.

No. 573,543. Patented Dec. 22, 1896.

Fig. 1

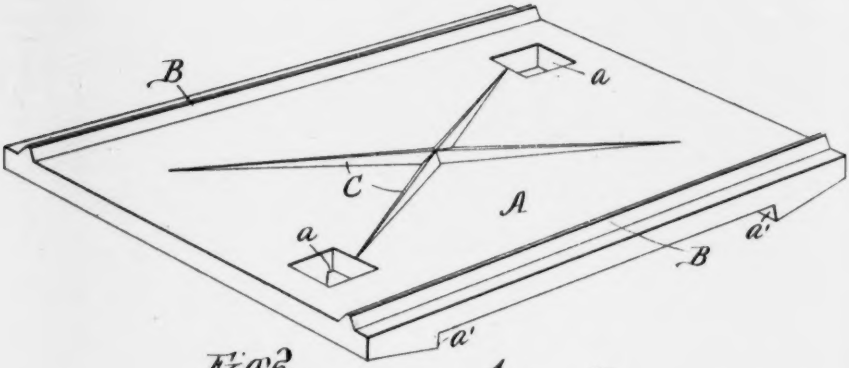


Fig. 2.

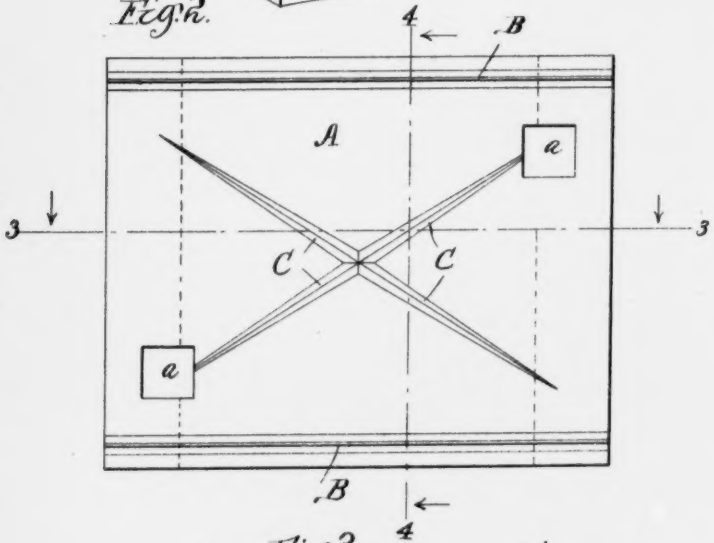


Fig. 3.

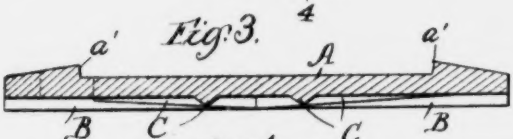


Fig. 4.

Witnesses.
Wm. M. Rheems.
Wm. O. Belt.

Inventor.
Morris Sellers
by Raymond & Cunningham
Attys.

UNITED STATES PATENT OFFICE.

MORRIS SELLERS, OF CHICAGO, ILLINOIS.

TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 573,543, dated December 22, 1896.

Application filed February 3, 1896. Serial No. 577,911. (No model.)

To all whom it may concern:

Be it known that I, MORRIS SELLERS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Tie-Plates, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to certain new and useful improvements in tie-plates adapted to be secured to the cross-ties of railroads to receive the rails and hold the latter in place on the ties.

The object of the invention is primarily to provide a tie-plate of simple construction which may be rolled into shape and firmly seated on the tie.

Another object of the invention is to provide a tie-plate which will not abrade or otherwise wear the tie when subjected to the usual strain and weight of the rolling-stock passing over the rails; and a further object is to construct the tie-plate in such a manner that it will take a firm hold of the tie, thereby preventing movement of the tie-plate without splitting or opening the tie and thus subjecting the interior thereof to the disastrous action of the elements; and a still further object of the invention is to provide a tie-plate with ribs which will engage the fibers of the tie in every direction.

With these and other ends in view I have fully described my invention hereinafter in connection with the accompanying drawings, referring to which—

Figure 1 is a perspective view of my improved tie-plate, showing the bottom thereof. Fig. 2 is a bottom plan view. Fig. 3 is a sectional view on the line 3 3 of Fig. 2, and Fig. 4 is a sectional view on the line 4 4 of Fig. 2.

The tie-plates are rolled in long strips and then cut into plates A of the proper length, each plate being provided with one or more holes *a* to receive the spikes by which the plate is secured to the tie. Side flanges *a'* are provided on the top of the plate to receive the rail (not shown) and hold the same securely in place on the tie-plate and tie.

On the bottom of the plate I provide a longitudinal rib B, adjacent to each side thereof, which is adapted to enter the surface of the tie and prevent, to a large extent, any lateral movement of the plate on the tie, as well as to protect that portion of the tie beneath the plate from water and other foreign matter which might otherwise work in beneath the sides of the plate. I also provide angularly-disposed ribs C between the longitudinal ribs B, which are adapted to engage the fibers of the tie in every direction, and for this purpose I have found that ribs crossed substantially in the manner shown in my drawings will operate to advantage, although I would have it distinctly understood that I do not hereby limit myself to this particular arrangement of the ribs, as it is only essential that they be angularly disposed with reference to the length of the plate, and any number of them may be employed. These ribs may be of any size and length, and they are tapered gradually from the middle to the ends, so that they will engage the fibers of the wood without splitting the same or forming deep depressions therein.

Besides operating to hold the plate securely in place upon the tie the ribs C, as well as the ribs B, also constitute braces for the plate and assist in maintaining the plate in its proper form and position.

By means of this improved construction of tie-plate I am enabled to manufacture them in great quantities by rolling at comparatively little expense, and they will remain firmly seated on the tie, notwithstanding the great strain to which they are subjected by reason of the peculiar construction and arrangement of the ribs on the bottom of the plate without splitting or otherwise opening the tie.

I am aware that changes in the form and proportion of parts and details of construction of my invention may be made without departing from the spirit and without sacrificing the advantages thereof, and I would therefore have it understood that I reserve the right to make all such changes as fairly fall within the scope and spirit of my invention.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. As a new article of manufacture, a tie-plate having on the bottom thereof ribs crossing each other and tapering from their meet-

1288

ing point to their ends, substantially as described.

2. As a new article of manufacture, a tie-plate having on the bottom thereof two ribs crossing each other at or about the center of the plate, said ribs being tapered from their point of juncture to their ends and adapted to be impressed into a railway-tie and engage the fibers thereof in all directions without cutting or splitting the tie, substantially as described.

3. As a new article of manufacture, a tie-plate adapted to be secured to a tie and having on the bottom thereof longitudinal ribs adjacent to each side and other ribs between said longitudinal ribs, crossing each other at or about their middle and tapering toward the ends, substantially as described.

MORRIS SELLERS.

Witnesses:
M. E. SHIELDS,
F. H. DRURY.

2017 & 2018 EXHIBIT S48.

KATE S. HOLMES,
Notary Public.

1290

(No Model.)

H. W. AVERY.

RAILWAY TIE PLATE.

No. 574,773. Patented Jan. 5, 1897.

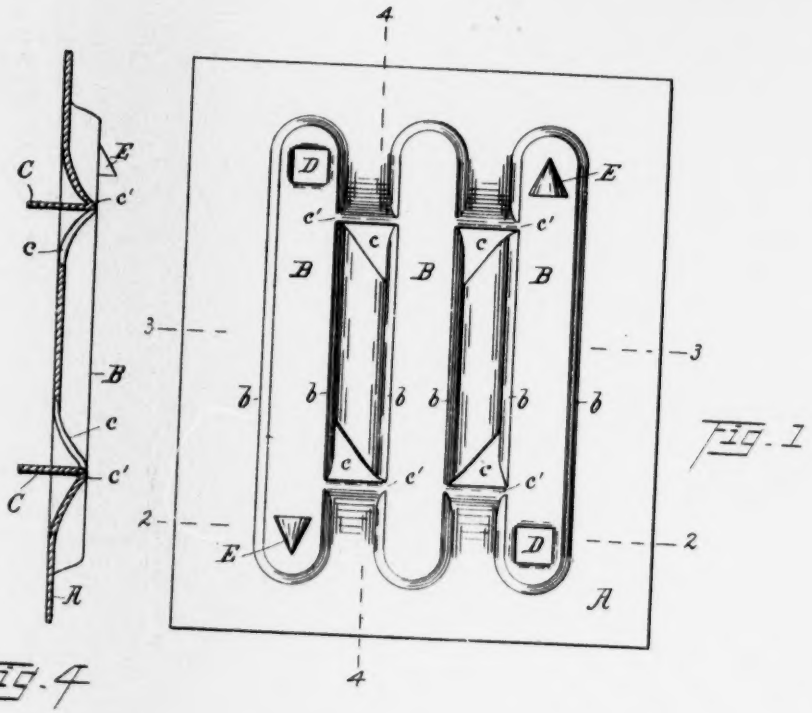


Fig. 4

Fig. 1

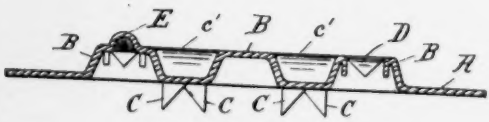


Fig. 2

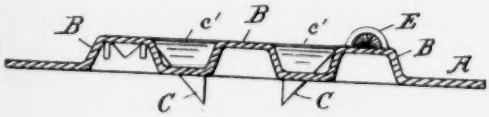


Fig. 3

Witnesses.
A. Griswold.
Francis J. Wing

Inventor.
Henry W. Avery
By E. L. Thurston
his atty

UNITED STATES PATENT OFFICE.

HENRY W. AVERY, OF CLEVELAND, OHIO.

RAILWAY-TIE PLATE.

SPECIFICATION forming part of Letters Patent No. 574,773, dated January 5, 1897.

Application filed March 19, 1896. Serial No. 583,999. (No model.)

To all whom it may concern:

Be it known that I, HENRY W. AVERY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Railway-Tie Plates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to tie-plates which are adapted to rest upon the ties and to support the rails for the purpose of preventing the rails from wearing the ties.

The object of the invention is to provide a very inexpensive but thoroughly efficient tie-plate which may be made of very thin metal of such shape that a number of the plates may, if desired, be formed on a long bar between suitable rolls, whereby the plates in a nearly completed condition may be cut from said bar. It is not my intention to limit the invention to a tie-plate constructed by this process, since it may be stamped or cast, if desired.

Another object of the invention is to produce a tie-plate which will be more or less resilient under the rail, whereby some of the pounding of the car-wheels and the strain and jar incident thereto will be absorbed in the plate, instead of being entirely transmitted through the plate to the tie.

Another object is to prevent the entrance and accumulation of water or dirt between the plate and tie and the consequent rotting of the tie.

Another object of the invention is to provide a tie-plate which is not liable to bend or buckle beneath the weight it supports.

Another object is to provide an enlarged bearing between the plate and the spikes which are mainly relied upon to hold the rail and plate in fixed relation to each other and to the tie, whereby the tendency of the plate to shear off the spikes is lessened.

The invention consists in a tie-plate having the several features of construction hereinafter described, and definitely pointed out in the claims.

In the drawings, Figure 1 is a plan view of my improved tie-plate. Fig. 2 is a sectional view on line 2 2 of Fig. 1. Fig. 3 is a sectional view on line 3 3, and Fig. 4 is a sectional view on line 4 4.

Referring to the parts by letters, A represents the tie-plate, which may be made of either wrought or cast metal, the former being preferred. The sides or marginal edges of the plate all lie in the same plane, wherefore when the plate rests upon a tie neither water, snow, or dust in any quantity can force its way between the tie and said edges at any point.

B B represent hollow transverse truss-ribs which extend upward from the plate and are integral with it. There may two or more of these truss-ribs—three or four being the preferred number—and they begin and end back from the edges of the plate—that is to say, they lie wholly within the marginal edges. When so formed, the part of the plate at the ends of the ribs prevents the ribs from being flattened out, as they might be if the ribs extended entirely to the ends of the plate. The sides *b* of these ribs are approximately vertical, whereby they have the requisite strength to support the weight of the rails and train. These sides are, however, slightly inclined, wherefore the ribs have a degree of resiliency which takes up much of the pound and jar of the passing trains. This relieves the tie of considerable wear, and at the same time there is less jarring and jolting on the train. These ribs also act as trusses to stiffen the plate and to prevent it from bending or buckling.

The tongues C, which enter the tie and assist in holding the plate in fixed position thereon, project downward from the under side of the parts of the plate which lie between the ribs and beneath the rail-flange. When the plate is made of cast-iron, these tongues are cast integral with the plate; but when the plate is made of wrought metal, whether rolled or stamped, these tongues are cut and turned down from that part of the metal between the ribs. When the tongues are formed in the manner last referred to, holes c are necessarily made in the plate, into which, if the plate were not constructed so as to prevent it, water would flow onto the tie to its injury. This is prevented by raising the metal on both sides of the hole, prefer-

ably to substantially the level of the ribs B. These raised portions c' in the best construction are beneath and bear against the rail, wherefore these holes c are so completely protected that no water or snow can get to pass through them onto the tie. Although it is best, as I now believe, to have these raised portions c' extended to the level of the ribs B, it is not essential, because the same result in kind, but to a less degree, may be secured if the metal c' around the holes is raised sufficiently to prevent the water from running through said holes. The shape of the tongues is not material, although I prefer that they shall be triangular. Two tongues may be formed between the two outer ribs on each side of said plate, as shown in the drawings; but a less or greater number may be formed, if desired. When so formed, the tongues preferably remain attached at the side nearest the adjacent edges of the plate, and the metal to which the tongues are so attached is preferably bent up to form a rib c', which extends between two ribs B B. These ribs not only prevent water from entering the holes c, but also strengthen and stiffen the plate.

The holes D for the spikes, which engage with the rail-flange, are formed in the best construction through the tops of the ribs B. To form these holes, the metal is not preferably cut away from the plate, but is cut through diagonally from the four corners of the square holes, leaving triangular tongues attached to each side thereof. These tongues are bent down and when the spike is inserted lie against its sides, thereby forming a broad bearing against the sides of the spike, which obviously reduces the liability of the plate shearing off the spike.

A boss or lug E, or two lugs, may be formed on the top of one or more of the ribs to serve as abutments for the rail-flange and prevent its lateral movement. These lugs may be pressed upward, if the plate is made of wrought metal, or may be cast on, if made of cast metal.

Having described my invention, I claim—

1. A railway-tie plate having two or more hollow truss-ribs which extend up from said plate and lie wholly within the marginal edges of the plate, and are adapted to support the rail, substantially as and for the purpose specified.

2. A railway-tie plate having its marg edges in one plane and having two or hollow truss-ribs which extend above plane and lie wholly within said marg edges, substantially as and for the pur specified.

3. A railway-tie plate having two or hollow truss-ribs which extend up from plate and are adapted to support the rail lie wholly within the marginal edges of plate, said plate having on its under si tongue or tongues which are attached to project downward from the metal betw said ribs, substantially as and for the pose specified.

4. A railway-tie plate having its marg edges in one plane, and hollow truss- which extend above said plane and lie wh within the marginal edges of the plate, tongues cut and turned down from the m between said ribs, substantially as and the purpose specified.

5. A railway-tie plate having its margi edges in one plane, and hollow truss-r which extend above said plane and lie wh within the marginal edges of the plate, a tongues cut and turned down from the me between said ribs, the metal between t hole thus formed and the edges of the pl being raised above said plane, substantia as and for the purpose specified.

6. A railway-tie plate having its margi edges in one plane and hollow truss-ribs which extend above said plane and lie whol within the marginal edges of the plate, a having tongues cut and turned down fro the metal between said ribs B and raised po tions c' raised to the level of the ribs B both sides of the holes from which sa tongues are cut, substantially as and for th purpose specified.

7. A railway-tie plate, having two or mo upwardly-extended hollow truss-ribs, an having spike-holes formed through the top of said ribs, and triangular tongues turne down on all four sides of said spike-holes substantially as and for the purpose specified

In testimony whereof I affix my signatur in presence of two witnesses.

HENRY W. AVERY.

Witnesses:

E. L. THURSTON,

L. F. GRISWOLD.

23 & 2024

EXHIBIT S49.

KATE S. HOLMES,
Notary Public.

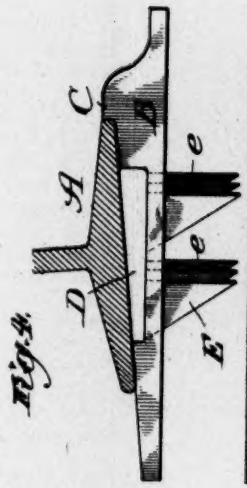
1294

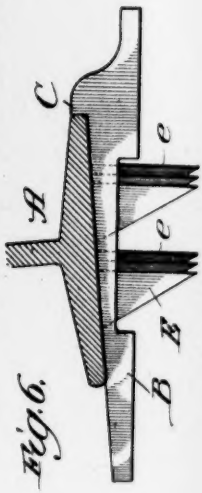
(No Model.)

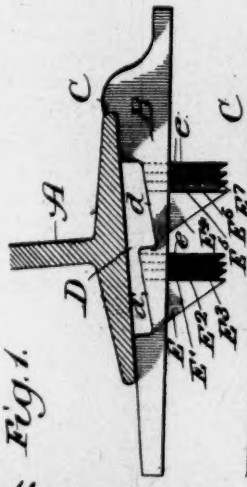
B. WOLHAUPTER.

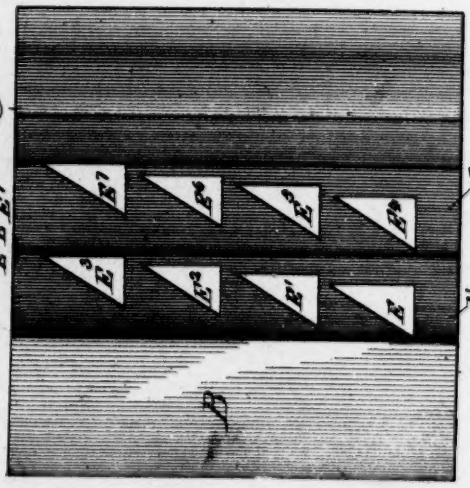
RAILWAY TIE-PLATE.

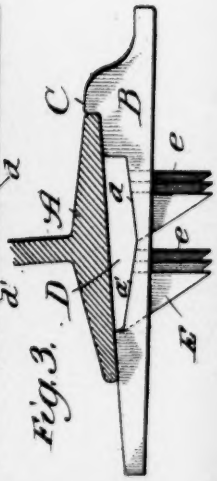
No. 579,509. Patented Mar. 23, 1897.











Witnesses
Chas. E. Hayford.
Lute L. Hill.

Inventor:
Benjamin Wolhaupter
By Walter H. Chamberlin
Atty

UNITED STATES PATENT OFFICE.

BENJAMIN WOLHAUPTER, OF CHICAGO, ILLINOIS.

RAILWAY-TIE PLATE.

SPECIFICATION forming part of Letters Patent No. 579,509, dated March 23, 1897.

Application filed October 19, 1896. Serial No. 609,378. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN WOLHAUPTER, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented a certain new and useful Improvement in Railway-Tie Plates; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its object the production of a railway-tie plate which can be easily and cheaply manufactured and yet embody the essential characteristics of a perfect article.

The details of the construction will be hereinafter more fully described and claimed.

In the drawings, Figure 1 is an end elevation of a tie-plate and a portion of a rail embodying my invention. Fig. 2 is a plan view of the same. Fig. 3 is an end elevation illustrating a slight variation in the form. Fig. 4 is another end elevation illustrating still another slight variation. Fig. 5 is a plan view illustrating still another modification. Fig. 6 shows a variation wherein the depression is on the under side instead of the top side of the plate.

In carrying out the invention, A represents the rail, and B the plate. The plate may or may not be formed with a rail-abutting flange C, but I prefer to form it with such a flange. So, also, the rail-seat may be formed on an incline, as shown, or not, as desired. The important feature of the invention lies in forming the plate with a depression D in the upper face of the plate, underneath the rail. This depression may be of a variety of shapes in cross-section, but I will first describe the form shown in Fig. 1. I will first state that I preferably form the plate by rolling a continuous bar and then cutting it up into the requisite lengths to form the tie-plates. When the bar is rolled, it is formed with the rail-abutting flange C and the depression D of the form in cross-section desired. Preferably at the same time that the bar is cut into the desired lengths to form the plates the depending tie-engaging projections E to E^3 are formed by stamping out portions of the metal of the shape desired and turning them down for projections, as shown in Figs. 1 and 2. These projections may be of any shape desired and may be in any location and arranged as desired. I prefer to have them of triangular shapes, as shown in Fig. 1, eight in number, and arranged, as shown in Fig. 2, in pairs, each pair out of alinement with the adjacent pair. By this arrangement the plate can be easily shifted to restore the gage of track, all but one pair of projections always entering the orifices made by the projections before the plate is shifted. This adjustable feature of the plate is set forth more elaborately in previous patents and pending applications, and I will not further discuss this feature. It will be seen that the side or edge *e* of each projection entering the tie forms the abutting edge for the projections against the wood composing the tie. In order that this edge may be the thickest, I shape the depression D as shown in Fig. 1, with the bottom of the depression having two inclined surfaces *d d'*. In Fig. 3 the depression D is somewhat different in cross-section, the two inclined surfaces being in opposite directions. In Fig. 4 I have not made the bottom of the depression inclined, but straight. In Fig. 5 I have altered the shape of the depending flanges, in this instance making three flanges F F' F^2 rectangular in cross-section. In Fig. 6 I have shown another variation in that the depression to form the thin metal from which to stamp the projections is made in the under side of the plate instead of the upper side of the plate. The result accomplished is obviously the same—that is, the thinning of the metal underneath the rail—so that without weakening the plate at the points where strength is required the projections can still be stamped from the metal. It will be observed that in each of these constructions the plate is rolled with the depression under the rail, where less metal is required, and the depending tie-engaging flanges stamped out of and turned down from this thin metal.

It will thus be seen that the plate can be originally rolled in bar form and then in the same operation can be cut into lengths and the tie-engaging flanges or projections formed thereon, thus making an extremely cheap plate, while at the same time it is effective for

its work and strong enough to stand the pressure brought upon it.

What I claim is—

1. A railway-tie plate formed with a depression below the rail and one or more tie-engaging flanges or projections stamped out of and turned down from the thinner metal formed by reason of said depression, substantially as described.

2. A railway-tie plate formed with a depression below the rail, said plate having a rail-abutting flange on its upper side and one or more tie-engaging flanges on the under side turned down from the thinner metal formed by reason of the depression, substantially as described.

3. A railway-tie plate formed with a depression below the rail and one or more tie-engaging projections of triangular shape stamped from the thinner metal formed by reason of said depression, substantially as described.

4. A railway-tie plate formed with a depression below the rail said plate having a rail-abutting flange and a series of triangular-shaped depending projections stamped from the thinner metal formed by reason of said depression, substantially as described.

5. A railway-tie plate provided with a depression below the rail said plate having a rail-abutting flange and a series of triangular-shaped depending projections stamped from the thinner metal formed by reason of said depression, one projection being out of transverse alinement with the adjacent one, substantially as described.

6. A railway-tie plate formed with a depression below the rail said depression formed with one or more inclined surfaces and depending tie-engaging projections stamped from the thinner metal formed by reason of said depression, substantially as described.

7. A railway-tie plate formed with a depression below the rail said depression formed with one or more inclined surfaces and triangular-shaped depending tie-engaging projections stamped from the thinner metal formed by reason of said depression, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

BENJAMIN WOLHAUPTER.

Witnesses:
ESTHER W. ROTHELLE,
DE WITT W. CHAMBERLIN.

29 & 2030

EXHIBIT S50.

KATE S. HOLMES,
Notary Public.

(No Model.)

I. F. TILLINGHAST.

TRACK FASTENING.

No. 584,248. Patented June 8, 1897.

FIG. 1.

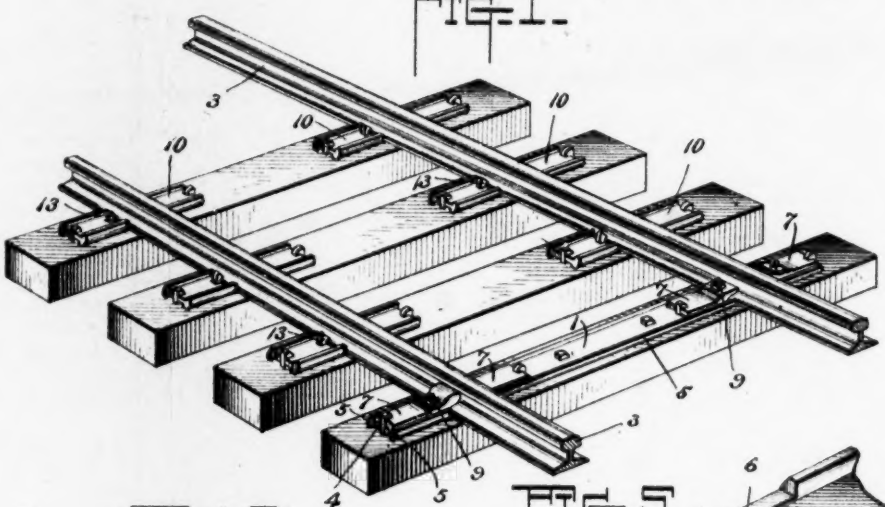


FIG. 2.

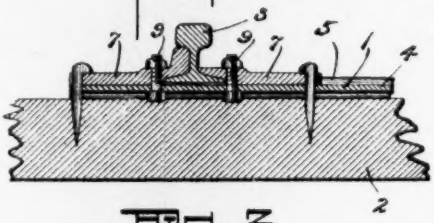


FIG. 5.

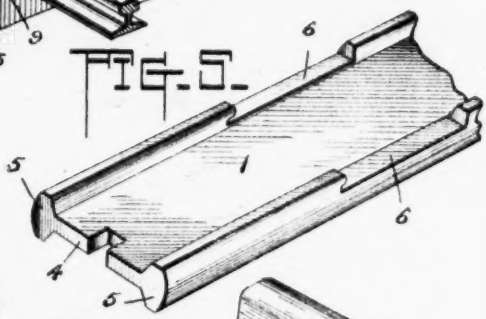


FIG. 3.

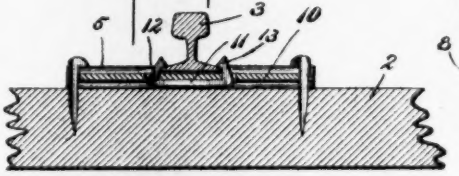


FIG. 6.

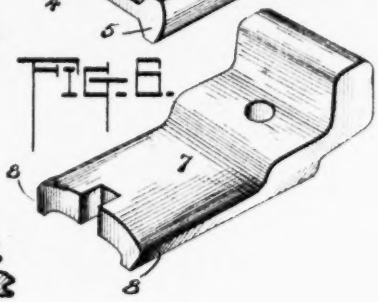
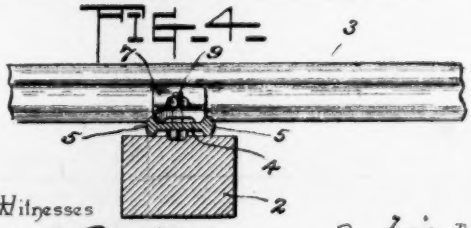


FIG. 4.



Witnesses
A. M. Poynter.
J. A. Riley

Inventor
Isaac F. Tillinghast.

By his Attorneys.

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

ISAAC F. TILLINGHAST, OF LA PLUME, PENNSYLVANIA.

TRACK-FASTENING.

SPECIFICATION forming part of Letters Patent No. 584,248, dated June 8, 1897.

Application filed August 19, 1896. Serial No. 603,262. (No model.)

To all whom it may concern:

Be it known that I, ISAAC F. TILLINGHAST, a citizen of the United States, residing at La Plume, in the county of Lackawanna and State of Pennsylvania, have invented a new and useful Track-Fastening, of which the following is a specification.

The invention relates to improvements in track-fastenings.

The object of the present invention is the preservation of ordinary wooden cross-ties and to protect the face of the cross-tie and prevent it from being cut, worn, and weakened at the point where the rail crosses it and is ordinarily spiked to it, and to obviate the necessity of spiking a rail at this point.

A further object of the invention is to retain a rail in its horizontal position and prevent it from becoming tipped or canted, as a rail when inclined out of its proper position is soon destroyed by car-wheels.

Another object of the invention is to prevent rails from creeping or slipping ahead in hot weather when the slack is taken up by the natural expansion of the metal and to secure the greatest possible safety and immunity from accidents by securely fastening the rails in position.

A further object of the invention is to provide for protecting cross-ties a plate which, while possessing maximum strength, durability, and lightness, will possess a form that will enable it to be readily rolled from iron or steel at a minimum cost of production.

The invention consists in the construction and novel combination and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended.

In the drawings, Figure 1 is a perspective view of a portion of a track provided with my improvements. Fig. 2 is a transverse sectional view of one side of the track, illustrating the manner of clamping a rail in position. Fig. 3 is a similar view illustrating the manner of securing a rail when the clamps are not employed. Fig. 4 is a sectional view taken transversely of one of the cross-ties. Fig. 5 is a detail perspective view of a portion of one of the plates. Fig. 6 is a similar view of one of the clamps.

Like numerals of reference designate corresponding parts in all the figures of the drawings.

1 designates a plate constructed of suitable metal arranged on the upper face of a cross-tie 2 and interposed between the same and rails 3, whereby the cross-tie is protected and is prevented from being worn, cut, or otherwise injured by the rails. The plate 1, which is preferably rolled from iron or steel and which is substantially I-shaped in cross-section, consists of a central flat body portion 4 and longitudinal side ribs 5, projecting from the upper and lower faces of the central body portion 4 and forming longitudinal depressions or recesses in the upper and lower faces of the plate. The ribs, which are adapted to settle in the upper face of the cross-tie to obtain a firm seat on the same, have blunt lower edges, whereby they are adapted to support the body of the plate above the upper face of the cross-tie. The upper portions of the ribs are provided at opposite ends of the plate with recesses 6, forming seats for the rails. The recesses 6 are provided, preferably, at their inner ends with straight vertical shoulders and have undercut or inclined outer shoulders which are adapted to engage the adjacent portions of the bottom flanges of the rails to assist in retaining them in their seats. These seats 6 prevent the rails from spreading and form a perfect gage.

The rails are preferably secured in the seats of the plate 1 by a pair of clamps 7, preferably substantially L-shaped, and consist of horizontal base portions and upwardly-extending arms engaging the opposite faces of and conforming to the configuration of a rail, as clearly illustrated in Figs. 1 and 2 of the accompanying drawings. These clamps provide effective braces for supporting the rails, and their horizontal portions are oppositely beveled at 8 and fit snugly in the depression or recess at the upper face of the plate between the ribs 5, whereby they are securely fastened to the plate by a single fastening device 9, which consists of a bolt. The outer edges of the longitudinal side flanges are preferably rounded and their inner edges are oppositely beveled. These clamps are adapted to afford a firm support for the rails and are especially advantageous for use on curves,

where the rails are subjected to great lateral strain.

The plate is provided at intervals with perforations for the reception of fastening devices for securing it to a cross-tie, and the fastening devices, which may consist of spikes or bolts, are arranged a sufficient distance from the rails to locate them at a firm solid portion of the cross-tie, and the plate obviates the necessity of spiking or similarly securing the rails adjacent to the weakened portion of the cross-tie.

The plates are designed to be applied to ordinary wooden cross-ties after the latter have been in use, in order to enable a cross-tie, after it has become worn, to be still further used and to avoid the expense of discarding cross-ties and supplying new ones. It has been found by experience that a cross-tie is worn or cut adjacent to the rails, and is thereby weakened to too great an extent to admit of spiking a rail to it long before the wood is decayed, and in applying the plate to such cross-ties the latter are preferably turned over to bring their lower faces uppermost.

It is unnecessary to supply each of the cross-ties of a pair of rails with a plate 1, as two of such plates to a pair of rails will be sufficient to provide a firm support for the rails, and the intermediate cross-ties may be provided with short plates 10, interposed between the rails and the cross-ties, to prevent the latter from being cut or worn by the vibration of the rails. The rails are preferably secured to these short plates by staples 11, disposed longitudinally of a cross-tie and having their arms 12 passed through perforations of the plates 10 from the bottom thereof. The arms 12 of the staples are provided at their upper ends with projections 13 at their upper edges and shouldered at their lower edges in order to enable them to spring readily into engagement with the bottom flanges of a rail and obtain a firm hold on the same.

It will be seen that the plate is simple and comparatively inexpensive in construction, that it possesses great strength, durability, and lightness, and that it is capable of being readily applied to worn cross-ties and of preserving them, to avoid discarding such worn cross-ties and enable them to be retained in use until the wood decays.

What I claim is—

1. In a device of the class described, the combination of a metal plate substantially I-shaped in cross-section, designed to be interposed between a wooden cross-tie and a rail and consisting of a flat central body portion and side ribs projecting above and below the central body portion and forming upper and lower depressions or recesses, the upper ribs being recessed to provide rail-seats and the lower ribs having blunt lower edges adapted to rest upon the upper face of a cross-tie, whereby the central body portion of the plate is supported above the upper face of the cross-tie, and means for securing the rails in the seats, substantially as described.

2. In a device of the class described, the combination of a plate substantially I-shaped in cross-section constructed of metal, designed to be interposed between a wooden cross-tie and a rail, and consisting of a flat central portion and longitudinal side ribs extending above and below the central portion of the plate and having their inner edges beveled, said ribs being provided, at the upper face of the plate, with recesses forming rail-seats, and clamps mounted on the plate, adapted to engage the opposite faces of a rail to support and secure the same to the plate, and having their lower portions oppositely beveled and fitting into the upper recess or depression of the plate, substantially as and for the purpose described.

3. In a device of the class described, the combination of a plate constructed of metal, designed to be interposed between a wooden cross-tie and a rail and consisting of a flat central body portion, and longitudinal side ribs extending above the central portion of the plate and provided with recesses forming rail-seats, and clamps mounted on the plate, adapted to engage the opposite face of the rail to support and secure the same to the plate and having their lower portions fitting in the recess or depression formed by the said longitudinal ribs, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ISAAC F. TILLINGHAST.

Witnesses:
JOHN H. SIGGERS,
HAROLD H. SIMMS.

2035 & 2036 EXHIBIT S51.

KATE S. HOLMES,
Notary Public.

1302

(No Model.)

J. T. RICHARDS.

RAILROAD CHAIR OR TIE PLATE.

No. 584,603. Patented June 15, 1897.

Fig. 1.

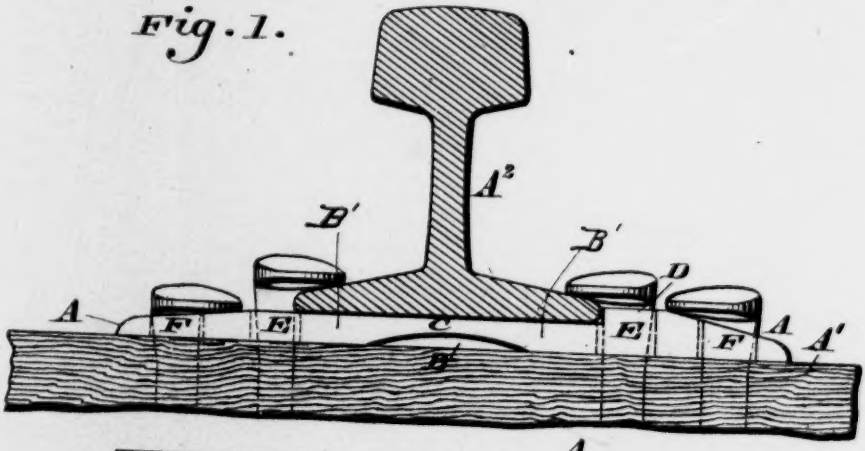


Fig. 2.

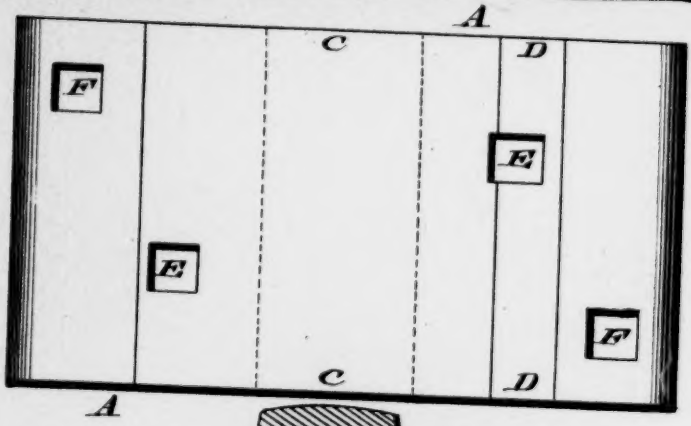
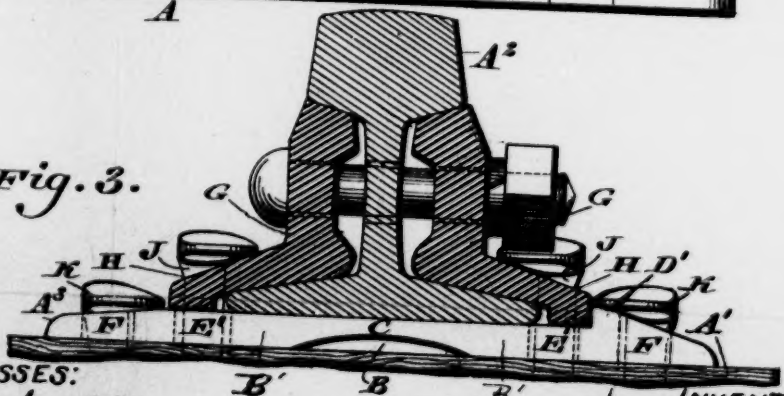


Fig. 3.



WITNESSES:
P. H. Hagle.
L. Douville.

INVENTOR
BY Joseph T. Richards
Edward Dodge Tolhurst
ATTORNEY.

UNITED STATES PATENT OFFICE.

JOSEPH T. RICHARDS, OF PHILADELPHIA, PENNSYLVANIA.

RAILROAD CHAIR OR TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 584,603, dated June 15, 1897.

Application filed January 17, 1896. Serial No. 575,848. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH T. RICHARDS, a citizen of the United States, residing in the city and county of Philadelphia, Sta' Pennsylvania, have invented a new a ful Improvement in Railroad Chairs Plates, which improvement is fully set in the following specification and accompanying drawings.

My invention relates to an improvement in a chair or tie-plate adapted to support a railroad-rail and protect the cross-tie or sleeper; and it consists of the formation of such chair or plate with both a cushion or elastic and an inelastic bearing for the rail, said chair or plate having on one side of the upper face thereof a shoulder against which the base of the rail may be seated and openings at different distances from the center of the chair or plate for spiking, respectively, the rail, chair, and tie and the chair and tie.

Figure 1 represents a side elevation of a railroad chair or tie-plate embodying my invention, including a vertical section of a rail in position thereon. Fig. 2 represents a top or plan view thereof. Fig. 3 represents a vertical section thereof, including splice-bars.

Similar letters of reference indicate corresponding parts in the several figures.

Referring to the drawings, A designates a railroad chair or tie-plate which is adapted to be placed intermediate of the cross-tie A′ and rail A^2. On the under side of the chair or plate is the channel B, which occupies a position below the central part of the rail and reduces the thickness of the metal thereat, producing the elastic neck C on which the rail is seated and supported, while, however, firmly sustaining the rail, owing to the fact that the channel B does not extend into the portions B′ B′ of the tie-plate, said portions being formed uncut or unchanneled on either their upper or lower faces and resting solidly and flat on the tie A′. By this provision there is both an elastic and an inelastic bearing for the rail within the width of the flange thereof, so as to overcome the deadness of a solid bearing and the insecurity and weakness occasioned by cushioned bearing, especially when the latter alone extends at least the full width of the base of a rail and more so.

Rising from one side of the upper face is the vertical shoulder D, against which the base of the rail is adapted to abut, and in the inelastic or unchanneled portions are openings E and F at different distances from the center of the chair or plate for spiking or fastening the rail to the chair and tie and the chair to the tie. Where splice-bars are employed, as shown at G G, Fig. 3, the base of one of said bars abuts against the shoulder D′, while there is no corresponding shoulder for the base of the opposite splice-bar. Openings H are made in the bases of the splice-bars coincident with openings E′ in the chair or tie-plate A^3 for the passage of the spikes or bolts J therethrough.

In the Letters Patent No. 531,862, granted to me on the 1st day of January, 1895, there is shown a railroad chair or tie-plate formed of two thicknesses of metal, the ends of the lower part being separated, forming a channel whereby the portion of the upper part above said channel constitutes a cushion or elastic bearing for the rail, and said upper part is also bent or crimped vertically, so as to produce two shoulders, one for each side of the base of the rail.

In the present case the chair or tie is formed of a single plate of metal rolled into proper shape with a shoulder on one side of the upper face thereof and an unbroken surface on the face opposite to said shoulder, so as to permit the application and removal of the splice-bars and rail in a direction sidewise to and from said shoulder. Furthermore, there is no provision shown in said patent for the employment of splice-bars in connection with a chair or tie of the order stated; wherefore I have made an improvement in the art, and

I claim as my invention—

A railroad-chair formed of a single piece of metal with a central channel on its under side and unchanneled side portions, a vertical shoulder on the outer end of one of the unchanneled portions, and openings in the unchanneled portions at different distances from the center of said chair for spiking respectively the rail, chair and tie, and the chair and tie.

JOSEPH T. RICHARDS.

Witnesses:
JOHN A. WIEDERSHEIM,
WM. C. WIEDERSHEIM.

1305

(No Model.)

2 Sheets—Sheet 1.

J. W. CLOUD.

RAIL JOINT.

No. 592,865.

Patented Nov. 2, 1897.

FIG. 1.

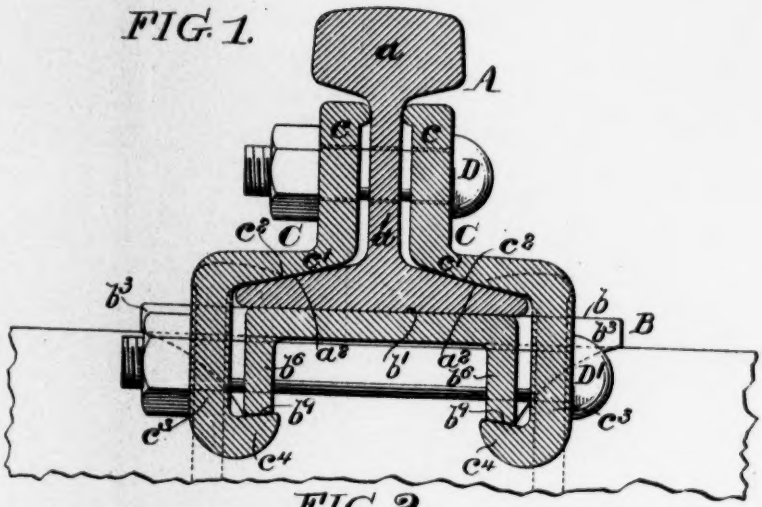


FIG. 2.

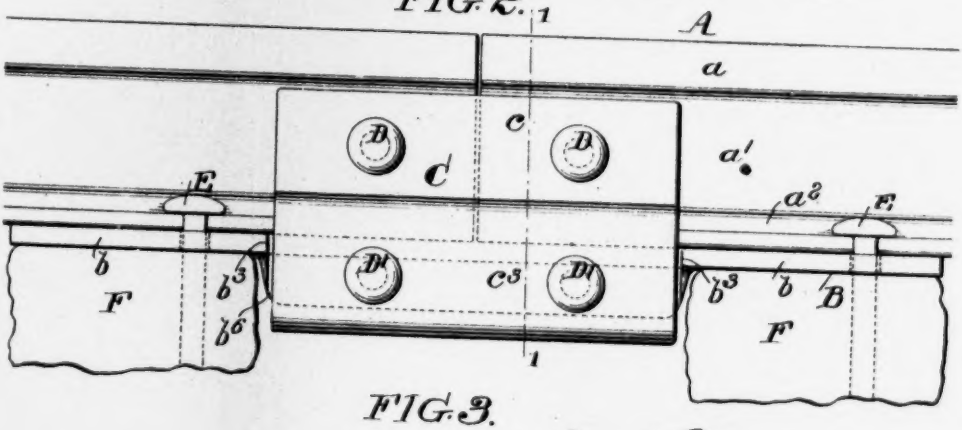


FIG. 3.

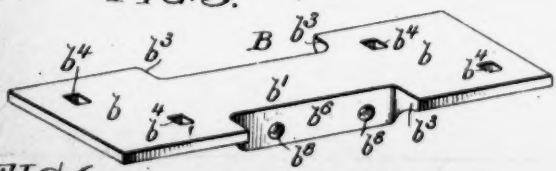
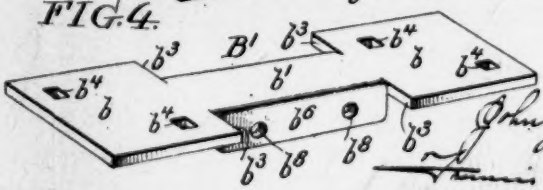


FIG. 4.



Witnesses.

Inventor.

John W. Cloud

by Francis J. Clarke

Attorney.

1306

(No Model.)

J. W. CLOUD.

2 Sheets—Sheet 2.

RAIL JOINT.

No. 592,865.

Patented Nov. 2, 1897.

FIG. 7.

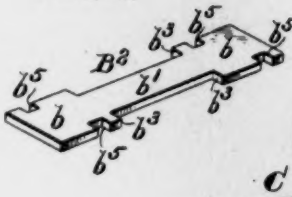


FIG. 5.

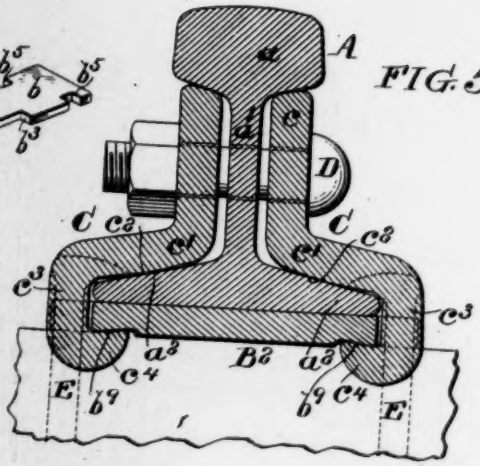


FIG. 6.

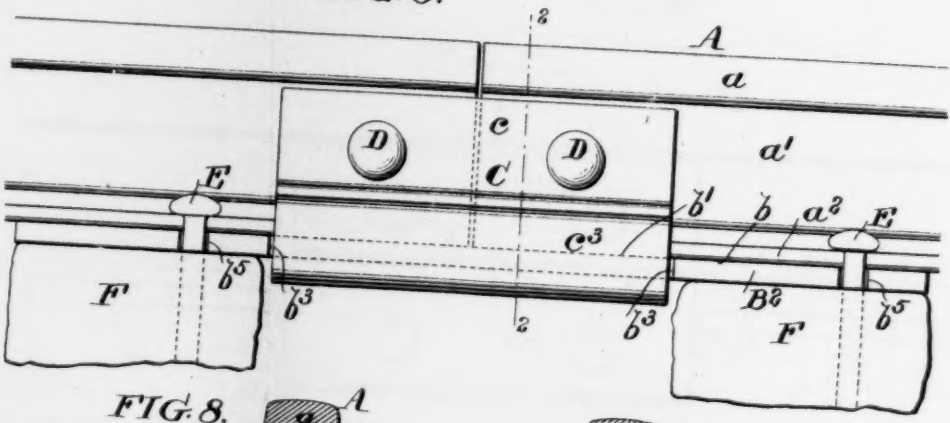


FIG. 8.

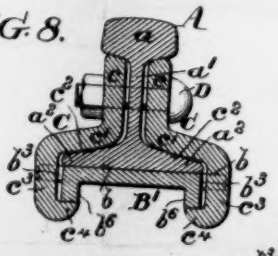


FIG. 9.

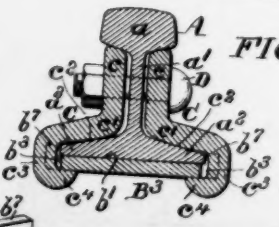


FIG. 10.

Witnesses.

Henry Dewey

D. Stewart

Inventor.

John W. Cloud

by Francis T. Chambers

his Attorney.

UNITED STATES PATENT OFFICE.

JOHN WILLS CLOUD, OF CHICAGO, ILLINOIS.

RAIL-JOINT.

SPECIFICATION forming part of Letters Patent No. 592,865, dated November 2, 1897.

Application filed January 27, 1896. Serial No. 576,907. (No model.)

To all whom it may concern:

Be it known that I, JOHN WILLS CLOUD, a citizen of the United States, residing in the city of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Rail-Joints, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of the specification.

My invention relates to rail-joints, and has for its object to provide a joint of simple and cheap construction and which is adapted to preserve both the line and surface of the rails, and also to prevent creeping.

The nature of my improvements will be best understood as described in connection with the drawings in which they are illustrated, and in which—

Figure 1 is a transverse section through my rail-joint, constructed for the greatest strength, the section being taken on the line 1 1 of Fig. 2. Fig. 2 is a side view of the same joint; Fig. 3, a perspective view of the base-plate shown in Figs. 1 and 2; Fig. 4, a perspective view of a slightly-modified form of base-plate. Fig. 5 is a transverse section taken on the line 2 2 of Fig. 6, showing a modified form of joint. Fig. 6 is a side elevation of the joint shown in Fig. 5. Fig. 7 is a perspective view of the base-plate shown in Figs. 5 and 6. Fig. 8 is a cross-section through a rail-joint embodying a base-plate such as is shown in Fig. 4. Fig. 9 is a cross-section through a rail-joint embodying still another modification in the form of a base-plate, and Fig. 10 is a perspective view of the base-plate shown in Fig. 9.

A indicates the rails, a being the head, a' the web of the rail, and a^2 a^2 the base-flanges of the rail.

B, B', B^2, and B^3 indicate various modifications in the form of the base-plate, which is an essential element of my joint. As shown in Figs. 1, 2, and 3, the base-plate is marked B. It is made, as shown, of sufficient length to be supported on adjacent ties F F, lying on each side of the joint, and is secured to the ties by spikes or bolts E, which in the figures referred to pass through holes b^4 in the portions b b of the base-plate which rest upon the ties. The width of the base-plate is somewhat greater than that of the rail-base, so as to give room for spike-holes on each side of the rail, by which the base-plate is secured to the ties. The central portion b' of the base-plate is made thinner or narrower than the under portions, preferably somewhat narrower than the rail-base, thus forming shoulders b^3 b^3 at each end of the narrow portion, and between which shoulders lie the joint-plates to be hereinafter described. Preferably I form the base-plate of a rectangular piece of metal, pushing down the sides in a die, as indicated at b^6 b^6, these downwardly-turned central flanges strengthening and stiffening the base-plate, and also being broad enough to permit of the formation of bolt-holes, as indicated at b^8, and to afford a better hold for the jaws of the joint-plates I bevel the ends of the flanges inwardly, as shown at b^9 b^9.

The base-plate indicated in Figs. 4 and 8 is substantially similar to that indicated in Figs. 1, 2, and 3, except that the metal is slit to form the shoulders b^3 before the flanges b^6 are turned down at right angles to the central portion b', nor have I shown the bevels b^9 in this modification.

The base-plate shown in Figs. 5, 6, and 7 has the metal, which in the former figures is turned down to form the flange b^6, entirely cut away, and this base-plate also differs from the other forms already described in having in place of the spike-holes b^4 spike-notches b^5, this construction permitting the base-plate to be securely fastened to the ties and requiring less metal than the other forms. In this form of base-plate I form the bevels b^9 in rolling the plates and they extend as parallel grooves throughout its length.

The base-plate shown in Figs. 8 and 10 is substantially similar to that shown in Figs. 5, 6, and 7, except that it is made from a plate rolled with projecting sides or flanges, as indicated at b^7, the rail-base lying between these flanges, as indicated in Fig. 9, and I here omit bevels b^9, though they could be used if desired.

C C indicate the joint-plates. These joint-plates are made with an upper flange c, which

is adapted to lie against or near the upper part of the rail, either the upper part of the web, as shown in Fig. 1, or the lower part of the head, as shown in Figs. 5, 8, and 9. Below the flanges c are outwardly-extending flanges c', adapted to lie upon the rail-base. From the outer ends of these flanges extend downward flanges c^3, from the lower ends of which extend the inward flanges or jaws c^4, which rest beneath and engage the under side of the base-plate entering the bevels b^9 when they are used. The parts are of course proportioned for the rail and base-plate with which they are used. When the base-plate is provided with a downwardly-inclined flange b^6, the flanges c^4 of the joint-plates rest beneath these flanges, while when no such flange is provided the flanges c^4 rest directly on the bottom of the base-plate. In all cases the breadth of the joint-plate should be such as to nearly fit between the shoulders b^3 of the base-plate.

It is an important feature of my invention that the joint-plates should each bear upon the under side of the base-plate and upon the top of the rail-base, and they may also bear against the upper part of the rail, and this object is secured when desired by so constructing the joint-plates that they can quite well adapt themselves to a sufficient extent to the form and position of the parts with which they are used. In doing this I avail myself to a certain extent of the elasticity of the metal, preferably forming the under side or contacting face of the flange c' with a slight curve, as indicated at c^2. This curved contacting face permits the flange c' to slide more freely on the base of the rail and at the same time should be made so slight as to practically straighten itself out under the stress to which it is subjected. I find it advisable also to make the portion of the flange c' from which the flange c springs somewhat thinner than the rest of the flange, so that the metal will bend more readily at this point, permitting the flange c to be drawn inward or pressed outward when the flanges c' and c^4 have been brought to a fixed and permanent clamping-contact with the base-plate and rail-base.

A very slight curvature at the place indicated at c^2 and a very slight thinning of the flange will be sufficient to insure the adjustability of the joint-plate, and in the drawings I have somewhat exaggerated both features for the purpose of making clear and plain the details of constructions to which I have referred.

D D indicate bolts passing through the flanges c c of the joint-plates and through the webs of the rails. By means of these bolts the parts are drawn tightly together and held in place. Where a base-plate with downwardly-extending flanges b^6 is used, it is advisable to use also bolts D' D', which pass through the flanges c^3, as well as the flanges b^6, securing the lower part of the joint-plates together as well as the upper parts.

It will be seen that by the construction described the surface of the rails is secured both by the strength of the base-plate and the strength of the joint-plate. It is obvious, of course, that as the base-plate is secured to the ties and the joint-plates are securely anchored between the shoulders b^3 of the base-plates, as well as bolted securely to the webs of the rails, that my joint will effectually prevent creeping.

The engagement of the jaws c^4 with the bevels b^9 obviously tends to hold them in place against any strains offered by the upper bolts, and in this way the function of the lower bolts is filled in the plates like Fig. 5 and supplemented where such bolts are used.

When it is not desired to have the joint-plates bear against the upper part of the rail, it is not necessary to form the rounded bearing thereon for the upper part of the rail-base nor to make the portion C' of the flange thinner than the rest of the flange.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A rail-joint having in combination a base-plate adapted to lie beneath the abutted rail ends and to be supported and secured at each end on adjacent ties, said base-plate having a narrow central portion b', shoulders b^3 and inwardly and upwardly extending bevels b^9, with joint-plates C C adapted to fit and engage between the shoulders b^3 of the base-plate, to engage beneath said base-plates in bevels b^9 and upon the rail-base and to receive the bolts which pass through the rail-web, and bolts D passing through the rail-web and the upper parts of the joint-plates.

2. A rail-joint having in combination a base-plate adapted to lie beneath the abutted rail ends and to be supported and secured at each end on adjacent ties said base-plate having a narrow central portion b', downwardly-turned flanges b^6 b^6 and shoulders b^3, with joint-plates C C adapted to fit between the shoulders b^3 of the base-plate and to engage beneath the flanges b^6 of said base-plates upon the rail-base and to receive the bolts which pass through the rail-web, bolts D passing through the rail-web and the upper parts of the joint-plates and bolts D' passing through the flanges b^6 and the lower parts of the joint-plates.

3. A rail-joint having in combination a base-plate adapted to lie beneath the abutted rail ends with joint-plates C having flanges c^4 adapted to fit beneath the base-plate, flanges c adapted to receive the bolts which pass through the vertical webs of the rails and a flange c' adapted to lie upon the rail-base said flange being made thin at or near its junction with the flange c and bolts D adapted to pass through the webs of the rails and through flanges c.

1309

4. A rail-joint having in combination a base-plate adapted to lie beneath the abutted rail ends with joint-plates C having flanges c^4 adapted to fit beneath the base-plate, flanges c adapted to receive the bolts which pass through the vertical webs of the rails and a flange c' adapted to lie upon the rail-base the contacting face c^2 of said flange being rounded and the flange made thin at or near the junction of the flange c and bolts D adapted to pass through the rail-webs and through the flanges c of the joint-plates.

JOHN WILLS CLOUD.

Witnesses:
JOSEPH W. TAYLOR,
FREDK. PAPENBROOK.

1311 (No Model.)

3 Sheets—Sheet 1.

A. B. B. HARRIS.

GAGE ADJUSTING TIE PLATE.

No. 603,563. Patented May 3, 1898.

Fig. 1.

Fig. 1a.

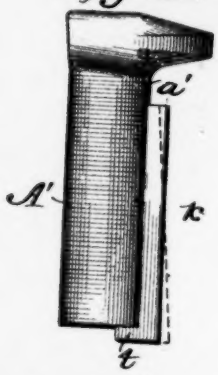


Fig. 1b.

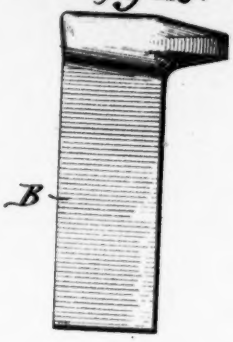


Fig. 2.

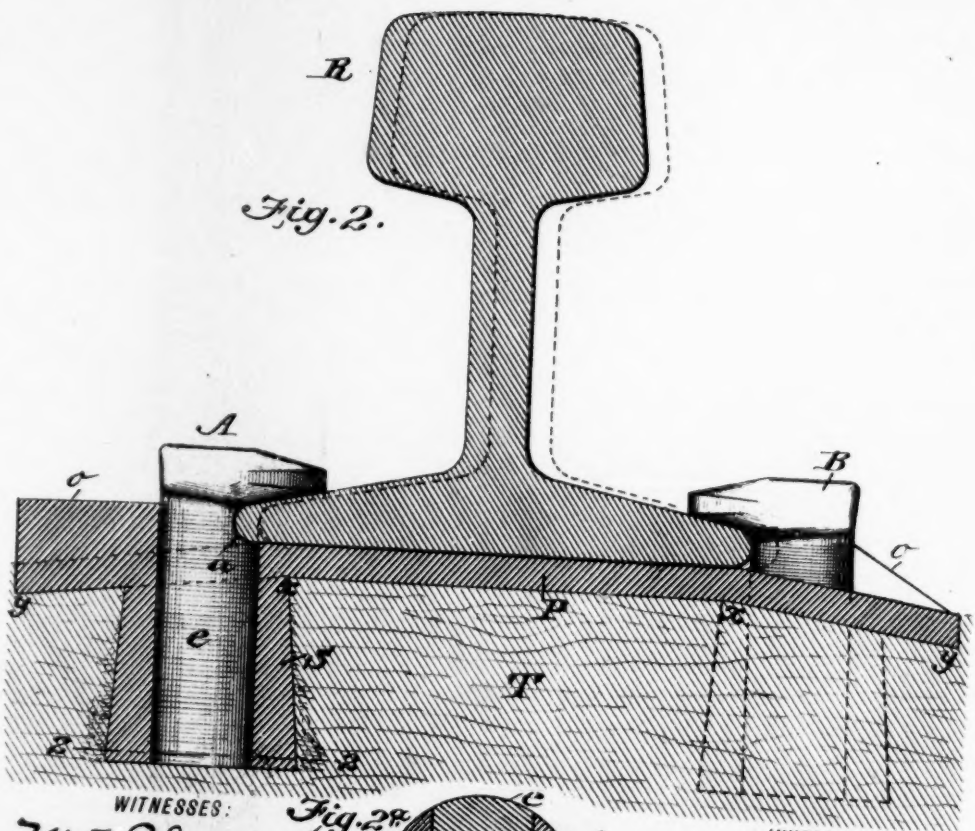
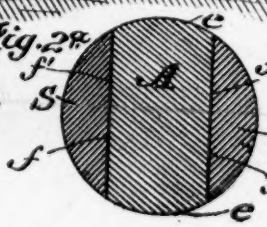


Fig. 2a.



WITNESSES:

W. S. Blondel.

Edw. W. Byrn.

INVENTOR

A. B. B. Harris.

BY Munn & Co.

ATTORNEYS.

1312 (No Model.) 3 Sheets—Sheet 2.

A. B. B. HARRIS.

GAGE ADJUSTING TIE PLATE.

No. 603,563. Patented May 3, 1898.

Fig. 3.

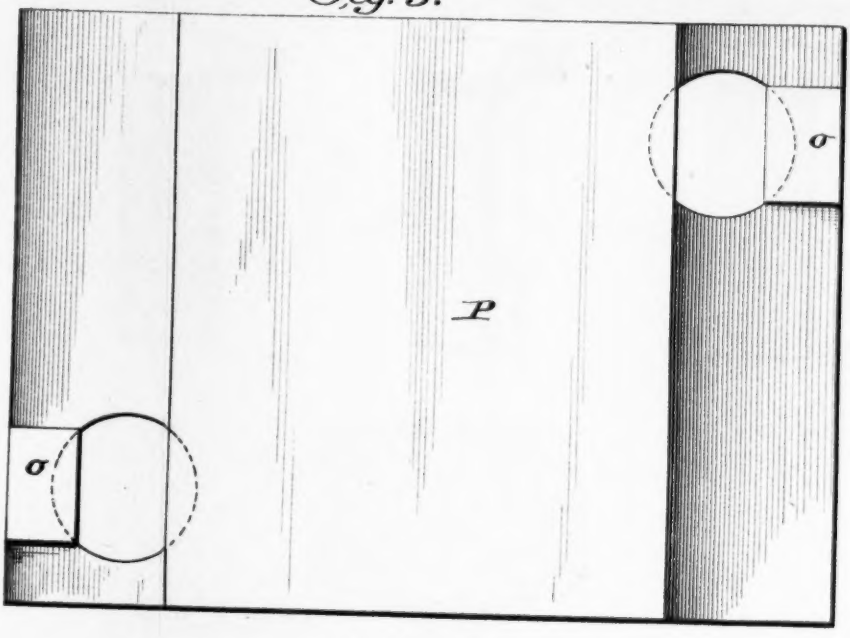


Fig. 4.

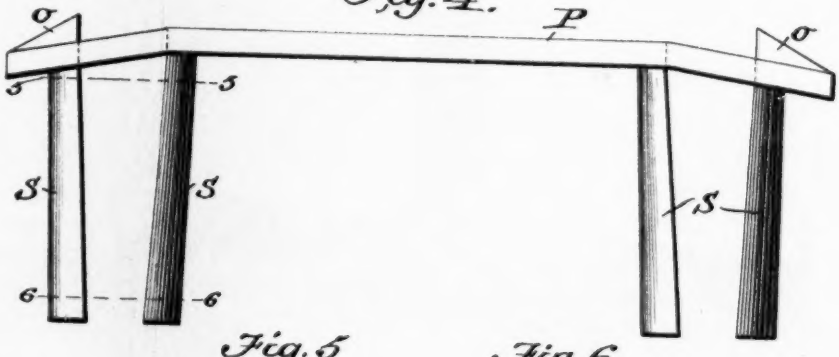


Fig. 5

Fig. 6.

WITNESSES

M. D. Blondel.

Edw. W. Byrn.

INVENTOR

A. B. B. Harris.

BY Munn & Co.

ATTORNEYS.

1313

(No Model.)

3 Sheets—Sheet 3.

A. B. B. HARRIS.

GAGE ADJUSTING TIE PLATE.

No. 603,563. Patented May 3, 1898.

Fig. 7.

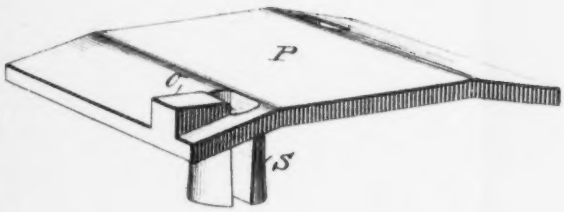


Fig. 8.

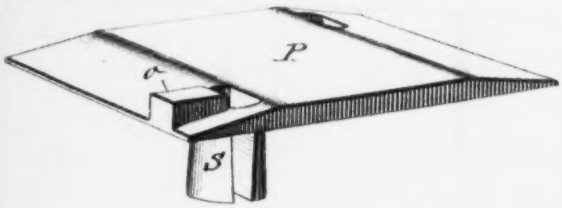
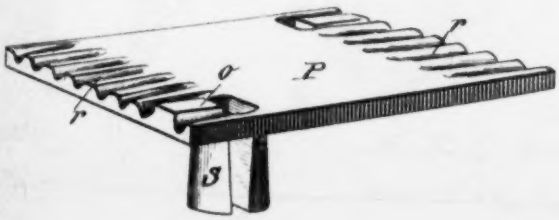


Fig. 9.



WITNESSES:

M. D. Blondel

Edw. W. Byrn.

INVENTOR

A. B. B. Harris.

BY Munn & Co

UNITED STATES PATENT OFFICE.

ALEXANDER B. B. HARRIS, OF BRISTOL, TENNESSEE.

GAGE-ADJUSTING TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 603,563, dated May 3, 1898.

Application filed July 24, 1897. Serial No. 645,763. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER B. B. HARRIS, of Bristol, in the county of Sullivan and State of Tennessee, have invented a new and useful Improvement in Gage-Adjusting Tie-Plates, of which the following is a specification.

My invention is in the nature of an improvement upon the railroad-tie plate shown and described in my Patent No. 560,497, granted May 19, 1896; and it consists in such features of construction and arrangement of the plates and spikes as will permit the railroad-rails to be adjusted laterally to correct any deviation from the proper and standard gage, and also in an improved construction of the plate.

In my patent referred to the tie-plate was provided on its under side with thimbles split longitudinally into four sections, forming spike-sockets which were integral with the plate, two sections being thicker at their lower ends, so that when such split thimbles were inserted in holes bored in the cross-ties and the spikes were driven through the thimbles the lower ends of the thimble-section which laid in the direction of the grain of the wood were expanded and made to clench or bind on the ties, so as to rigidly hold the tie-plates from either lifting up or moving laterally. With such a construction it is obvious that the rail, spikes, tie-plates, and tie are all rigidly locked together and are not susceptible of adjustment—that is to say, if the head of the rail should become ground off and worn away on the inside from the abrasion of the flange of the car-wheel, as always takes place on curves, the distance between the heads of the two rails is increased and the gage is changed. My invention is designed to provide for this by a readjustment of the rail to compensate for this wear, so as to restore the gage to the standard width and without sacrificing in any way any of the desirable features of my tie-plate or involving any extra expense.

To this end it consists in making the spikes of two different patterns, one with a straight shank up to its head, as in my former patent, and the other with a recess just under the head on the side next to the rail-base and arranging these two spikes on opposite sides of the rail interchangeably, so as to permit of the lateral readjustment of the rail when necessary.

The improvements in the plate comprise features designed to cheapen and facilitate its manufacture and to keep dirt and water from getting under it and between it and the rail, as will be hereinafter more fully described with reference to the drawings, in which—

Figure 1 is a side view of my new form of spike. Fig. 1ª is a side view of a modification of my new form of spike. Fig. 2 is a cross-section taken through the rail and tie-plate as applied to the tie in accordance with my invention. Fig. 2ª is a cross-section on line 2 2 of Fig. 2. Fig. 3 is a top plan view of the plate; Fig. 4, a side view of the same. Figs. 5 and 6 are sections through lines 5 5 and 6 6, respectively, of Fig. 4. Figs. 7, 8, and 9 are views in perspective showing modifications of the plate, and Fig. 10 is my old form of spike.

Referring to Fig. 2, R is the rail, T is the cross-tie, and P the tie-plate which connects the rail to the cross-tie and forms a base upon which the rail lies flat.

The tie-plate in my previous patent has cast, forged, or otherwise formed upon its lower side, so as to be integral therewith, the spike-sockets, which are cylindrical thimbles split longitudinally into four sections, of which those that lie in the direction of the grain of the wood in the tie are made thicker at their lower ends, so that when a hole is bored in the tie to receive this cylindrical spike-socket and the latter is inserted in the hole and a spike is driven down through it the lower and thicker ends of the socket-sections are pressed outwardly in the direction of the grain of the wood and are made to clench in the wood of the tie.

In my present invention, Figs. 1 and 2ª, I make the spike with two round edges *e e* and two flat sides *f f*. I dispense with two of the socket-sections and merely use the two tongues S S, which are thickest at their lower ends and lie in the direction of the grain of the wood, as shown in Figs. 4, 5, and 6. The advan-

tage of this form is that it can be more easily manufactured, and when the spikes are driven the bored hole in the tie is entirely filled with the tongues S S and spike, Fig. 2^a, and there are no slots or cracks left to receive water and rot out the tie. The outer circle of the tongues, close up under the plate, Fig. 5, is made to fit a one and one-fourth inch hole, and the space between them is three-fourths of an inch, or just equal to the thickness of the spike. The lower ends of the tongues are thicker (see Fig. 6) and the space between them is less than the thickness of the spike; but the inner faces f' f' at both the top and bottom of the tongues are just equal to the flat sides f f of the spike, so that when the lower ends are forced out the bored hole is completely and solidly filled, as before stated, and shown in Fig. 2^a. I also form the spike A with a recess a, Fig. 1, which reduces the thickness of the spike close up under its head on the side which is to overlap the rail-base, and this spike A, I use in connection with the old form of spike B, Fig. 10, described in my former patent. Both these spikes are merely expanding plugs and do not penetrate or come in contact with the wood of the tie, and hence need not be sharpened.

In securing the rail to the tie the tie-plate is adjusted so that its spike-sockets enter the bored holes in the tie, and one of my spikes A is driven in the spike-socket on the outside of the track. The rail R is then laid on the plate and is slipped laterally, so that the edge of the rail-base enters the little recess a in the spike A. The other and plain spike B is then driven down.

Now if the inner side of the rail-head (or the right side of Fig. 2) becomes worn away by the flange of the car-wheel and the gage is thus widened all that is necessary to do is to take out the spikes A and B and have them change places. This, it will be seen, allows the rail to be shifted to the right, as shown in dotted lines, and this corrects the deviation in gage without any extra parts or extra expense and without in the least impairing the anchorage of the tie-plate in the tie.

In Fig. 1^a I show a modification of the spike, in which a gib or key k is used which is made shorter than the spike A', so as to leave a space a' corresponding to recess a, and the gib or key has a toe t underlapping the spike end. If the wood of the tie be old and has lost its pinch or grip on the exterior of the tongues S, these latter may be tightened to a new hold in a very simple and practical way by this modification. In such case the gib or key k is made thicker at the bottom than it is at the top, as indicated in dotted lines in Fig. 1^a, and this gib or key is inserted in the socket between the tongues S before the spike is driven. This not only holds the rail in the same manner as before described, but further expands the tongues of the spike-socket and tightens up the latter in the wood of the tie. The object of the toe t on the key k is to prevent the key from being driven into the wood and also prevents the closing up of the recess a' at the top when the spike is driven to its lowest position even if the rail-base be not in the recess a'.

In constructing the plate P that part of it from the rail-base outwardly is made with a downward dip or inclination from x to y. The object of this form is threefold: First, it prevents dirt, sand, or water from getting between the rail and plate. It can readily be seen that sand or dirt falling on the incline surface will be washed away from the rail. This will assist in preventing the wear between rail and plate. Second, it will keep the plate from cupping up along the edge of the railing. Third, the under inclined surface will prevent water from getting under the plate or between the plate and tie. On the upper surface of the part x y are lugs o, which are immediately opposite to the spike-holes and are intended to brace the spikes. They may have either a flat horizontal top, as on the left of Fig. 2, or be inclined, as on the right. These lugs should extend slightly above the level of the middle of the plate, so as to better resist the lateral thrust of the base of the rail. These brace-lugs are only needed on the outside of the rail and for the most part will be so used, as shown in Figs. 7, 8, and 9. These plates may also be perfectly flat on the under side and beveled on the upper side, as in Fig. 8, or they may be flat on both top and bottom sides and have a series of inclined grooves or ribs r, as in Fig. 9, to drain water, sand, &c., away from the base of the rail.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A spike of substantially uniform transverse dimensions having beneath its head a recess reducing the thickness of the spike substantially as and for the purpose described.

2. A spike of substantially uniform transverse dimensions having a recess under its head formed by a detachable gib or key k having a flange or toe t at its lower end substantially as and for the purpose described.

3. A rail and tie fastening, comprising a tie-plate having on its under side integral spike-tongues as described and two expanding-plug spikes, one having a straight shank, and the other having a recess just beneath its head that reduces the thickness of the spike, said two spikes being arranged to go upon opposite sides of the rail and to be interchangeable to correct the gage of the rail substantially as and for the purpose described.

4. The combination of a spike having two circular edges and two alternating flat sides, and a tie-plate having on opposite sides of its spike-holes two downwardly-extending tongues, thicker at their lower ends than they are at their upper ends, and having their in-

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ner faces flat and corresponding to the flat faces of the spike, to completely fill a bored hole in the tie substantially as described.

5. A railroad-tie plate having a flat horizontal middle portion beneath the rail, and downwardly-inclined side portions with spike-braces *o* on their upper surfaces, and spike-tongues on the under side at the junction of the horizontal and inclined portions substantially as and for the purpose described.

ALEXANDER B. B. HARRIS.

Witnesses:
H. W. TAYLOR,
C. L. BUNTING.

1318

No. 610,179. Patented Sept. 6, 1898.

W. GOLDIE.

TIE PLATE.

(Application filed May 27, 1898.)

(No Model.)

Fig. 1.

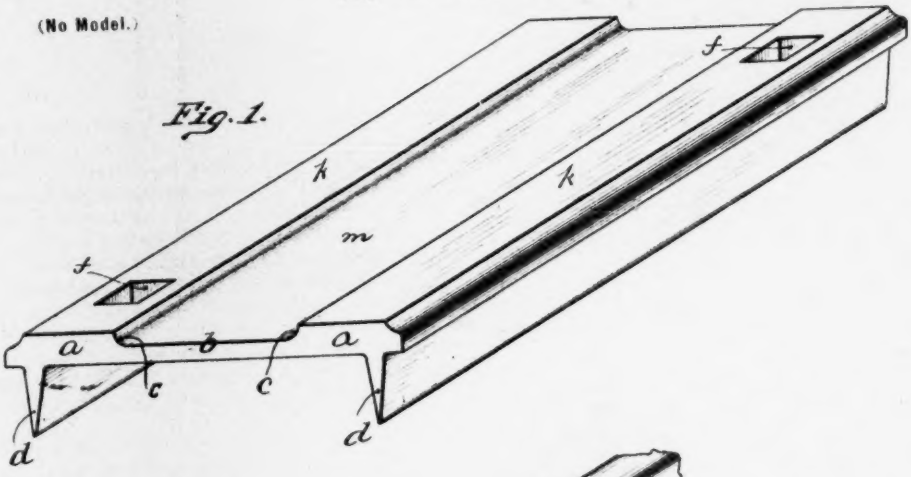


Fig. 2.

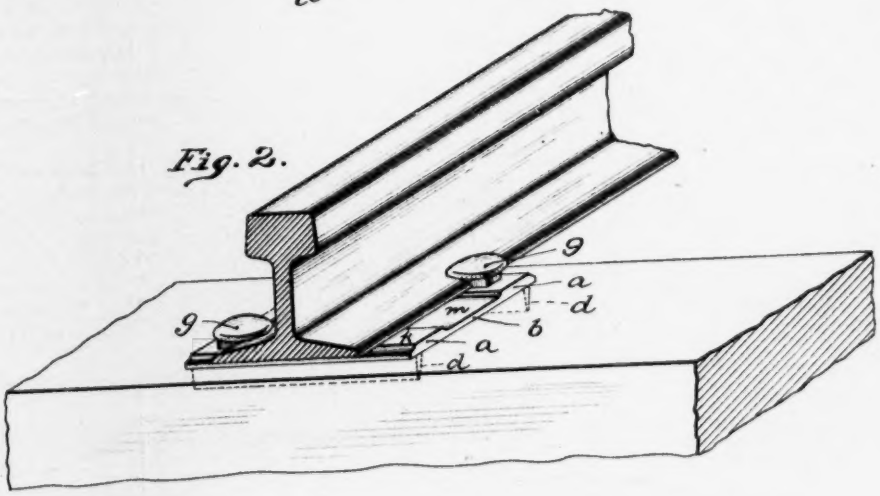
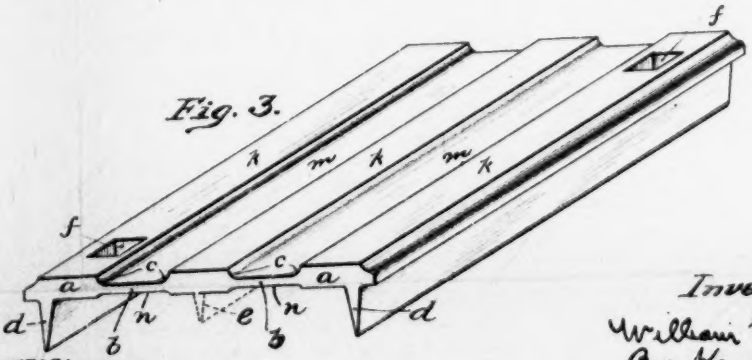


Fig. 3.



Witnesses:
Walter Famariss
Chas. Steb.

Inventor:
William Goldie
By Kay & Hutton
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM GOLDIE, OF WILKINSBURG, PENNSYLVANIA.

TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 610,179, dated September 6, 1898.

Application filed May 27, 1898. Serial No. 681,874. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GOLDIE, a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Tie-Plates; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to tie-plates, its object being to provide an efficient and cheap form of tie-plate for use with straight tracks or those where there is so little curve that the lateral strain on the rail is but slight.

While the most efficient plates heretofore produced have been of the class where the rail was held against lateral strain by a flange on the plate engaging with the rail and claws taking into the tie at right angles to its grain, this class of plates was required to be made heavy and was found to be expensive and has therefore been used principally in yards and such curves as are subjected to heavy strains from rapidly-passing trains. It has been found that where the track is straight or but slightly curved the lateral strain is not sufficient to cause movement of the plate, provided it has a sufficient hold on the tie, and such adhesion of the plate, together with the ordinary spikes, is sufficient to sustain ordinary strains. The principal difficulty with this class of plates has been, however, that they were extremely liable to buckle under the heavy weight of the passing trains, the plate being necessarily made of greater length than the width of the rail to give support to the spikes, and it being found that the pressure in the center of the plate would cause it to buckle. To provide for adhesion to the tie, it was the custom to provide these plates with downwardly-projecting flanges at the edges, which would cut into the grain of the tie substantially parallel therewith, and it was found that these flanges had not sufficient rigidity to properly brace the thin plate, and in order to obtain sufficient rigidity the custom has been to form a number of flanges—two, three, or more—between the outer flanges to sustain the plate against buckling and in the hope of obtaining a sufficient hold on the tie. Practical use of such plates has shown, however, that it was impossible with a plate having so many flanges to force the same down into the tie when the plate was first placed in position, as even the weight of the heaviest passing trains fails for some time to force so many flanges into the face of the tie, and it was therefore impossible to obtain proper track-surface. The numerous flanges so employed were also found to mutilate and destroy the wood fiber to such a degree that it became sponge-like and highly absorbent of moisture, which would enter and lead to rotting and so leave the plate unsupported, this being another cause of buckling. By my invention these difficulties are practically overcome and a rigid tie-plate having strong adhesion, and yet one that is light in weight and cheap, is obtained.

It comprises, generally stated, such a rail-sustaining plate formed of two or more thick rigid rail-sustaining bars connected by one or more thin webs, such plate having downwardly-projecting flanges below and extending along the bars and adapted to enter the tie, it being found that such thick bars give proper support to the rail, which is as well supported thereon as on a broader surface, while the plate has sufficient width to distribute the weight of the rail properly upon the tie, and thin flanges can be formed at or near the edges of the plate, which can take into the tie easily and can be driven down to place by suitable tools and so provide for immediate surfacing of the track.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a perspective view of one form of plate. Fig. 2 is a like view showing the rail, plate, and tie and illustrating its use; and Fig. 3 is a perspective view of another form of plate.

Like letters indicate like parts in each of the figures.

The tie-plates are formed by rolling bars of the desired section, cutting them to length, and punching them. They are formed of the thick rail-sustaining bars *a*, connected by one or more thin webs *b*, it being found that for general purposes a plate having two such bars *a*, connected by a single web *b*, gives all the surface and support necessary, though, if desired, the plate can be formed with, say, three such thick bars and two thin connecting-ribs, as shown in Fig. 3. It will be seen that while the bars are sufficiently thick to give all the necessary rigidity to the plate the

weight of the plate need not be increased to any material extent, because these bars are connected by thin webs, which reduce the weight of the plate. The thickness and width of the bar portions, as well as of the web portions, of course depend upon circumstances; but the section illustrated in the drawings is believed to be about the best, combining the peculiarity above referred to of rigidity with lightness of weight and distribution of the weight brought upon the rail over a considerable surface of the tie. The bars and webs can be connected by any suitable form of curve or fillet, as shown at *c*.

Extending along the under faces of the bars *a* are the flanges *d*, which, as shown, are preferably made of considerable depth, while their bodies are as thin as practicable, so that they will pass easily into the tie and, without greatly disturbing the fiber thereof, obtain a strong frictional hold thereon. It is only practicable to form thin deep flanges close to the edge of the plate, and for that reason where a central thick bar, as shown in Fig. 3, is employed I prefer to dispense with the flange below the same, employing the central bar in a wider plate in order to increase rigidity and give proper support to the rail. If desired, however, a flange may extend along the under face of the central bar, as shown in dotted lines at *e*. It will be noticed that the spike-holes *f* extend through the thick bar portions of the plate. This provides better support for the spikes, bracing them by means of the plate against lateral strain, the bar portions providing a comparatively thick body of metal forming a thick backing to the spike-neck and therefore through the spike and such thick bar portion giving all necessary support against lateral strain for the straight or slightly-curved portions of the track where this class of tie-plates is employed.

In the use of the plate in laying track the plate can be driven into the tie by any suitable hammers or mallets and the rail then placed over the plate and the spikes *g* driven home through the spike-holes *f*. Or after the rail is passed over the tie the plate can be passed under the rail, which is raised up for that purpose, and as there are but two flanges upon the plate and those near the outer edges thereof, and as these flanges can be made thin and long, the plate can be easily driven down into the tie by means of suitable hammers or mallets or by suitable wedges driven between the plate and rail and acting upon the top faces *k* of the bars *a* to wedge the plate down into the tie; or in soft wood the weight of the next passing train will be sufficient to drive them into the tie, after which the spikes can be driven to place or tightened, so as to form a complete joint.

In the use of the plate with tracks already laid it is only necessary to raise the rail and slip the plate under the same into position and then drive or wedge down the plate and spike it in place. After the plate has been secured in place it will be seen that the weight of the passing train is sustained by means of the thick bar portions of the plate, and though the entire surface of the plate does not give support to the rail it fully supports the rail along the outer edges of the plate, while the wide depression *m* in the plate above the thin web portion *b* will receive any dirt, &c., which might work under the rail and tend to raise it under the vibratory strains to which it is subjected. At the same time, on account of the width of the plate itself, the weight of the rail and of the train passing over it is distributed over a considerable portion of the surface of the tie, so that a better support is given to the rail and wear or cutting of the plate into the tie prevented.

For the purpose of thinning the web a slight depression, as at *n*, may be formed on the under face of the plate, and in hard-wood ties having irregular surfaces such depression will enable the plate to come to a firm bearing more quickly. In a plate of this construction there is practically no fear of the buckling of the body thereof, because the thick bar portions give great rigidity to the plate transversely of the rail, which is increased, of course, by the flange portions *d*, the combined thick bar portions *a* and flanges *d* providing such rigidity of plate that practically all tendency to buckle is overcome. At the same time strong adhesion of the plate to the tie is obtained because of the possibility of forming thin deep flanges which can pass into the tie without mutilating the same, and the liability to such mutilation as would cause a spongy structure under the plate, as above referred to, is practically overcome. By the conformation of the plate and distribution of the metal therein I therefore obtain a tie-plate which is light and cheap and has great vertical strength, is easy of application to the tie, and has practically perfect adhesion thereto.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A rail-sustaining plate formed of two or more thick rigid rail-sustaining bars connected by one or more thin webs, and downwardly-projecting flanges below and extending along the bars and adapted to enter the tie, substantially as set forth.

2. The combination with a rail and tie, of a tie-plate having two or more thick rigid rail-sustaining bars upon which the rail rests, and a connecting-web between said bars, and downwardly-projecting flanges below and extending along the bars and entering the tie substantially longitudinally of its fiber, substantially as set forth.

In testimony whereof I, the said WILLIAM GOLDIE, have hereunto set my hand.

WILLIAM GOLDIE.

Witnesses:

ROBT. D. TOTTEN,

JOHN N. RADCLIFFE.

POOR COPY

KATE S. HOLMES,
Notary Public.

1322

No. 622,965. Patented Apr. 11, 1899.

A. MORRISON.

TIE PLATE.

(Application filed Oct. 25, 1898.)

(No Model.)

Fig. 1.

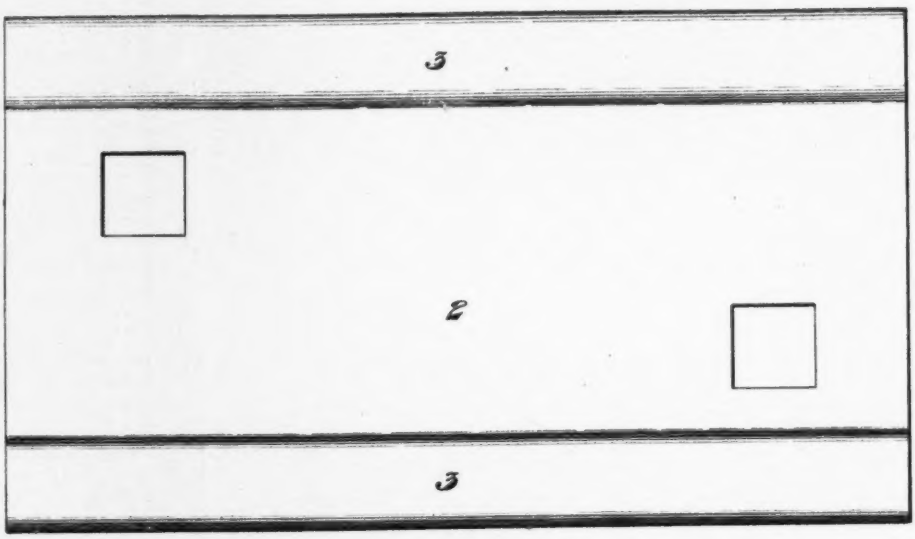


Fig. 2.

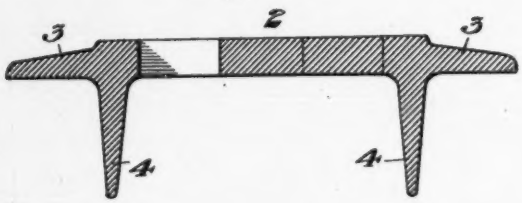
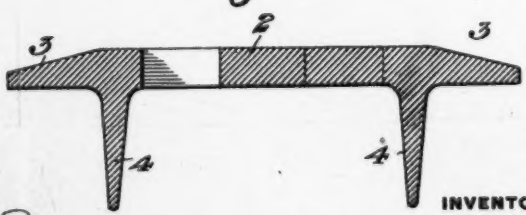


Fig. 3.



WITNESSES

L. A. Sommers.

G. J. Holdskip

INVENTOR

Andrew Morrison

by Bakewell & Bakewell

his attys.

UNITED STATES PATENT OFFICE.

ANDREW MORRISON, OF PITTSBURG, PENNSYLVANIA.

TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 622,965, dated April 11, 1899.

Application filed October 25, 1898. Serial No. 694,514. (No model.)

To all whom it may concern:

Be it known that I, ANDREW MORRISON, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Tie-Plates, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a top plan view of one form of my improved plate, and Figs. 2 and 3 are cross-sections showing different forms of the thinned side extensions.

My invention relates to tie-plates, and is designed to prevent the rocking action which naturally takes place as the load comes upon one side of the plate and as it leaves the other side.

To that end it consists in a plate having thinner extensions projecting laterally from its side edges, these extensions being adapted to prevent the rocking action by giving a support on each side beyond the bearing-point of the rail upon the plate.

In the drawings, in which I have shown my invention as applied to a plate having ribs or claws, 2 represents the plate-body, having the thinner side extensions 3 3, these being preferably beveled or inclined upon their upper faces. The extensions are of sufficient width, so that their flat bottom faces will give sufficient bearing upon the tie to prevent the rocking of the plate as the load comes above either edge of the plate-body.

I have shown the plate as provided with depending flanges 4 4, which extend longitudinally of the plate and are arranged to enter the tie longitudinally of the grain; but it is evident that the plate may be provided with other forms of flanges or ribs or with a plain bottom face without departing from my invention, which lies in the use of the thinner flanges or extensions projecting from the edges of the plate and arranged to reduce the rocking action.

The advantages of my invention will be apparent to those skilled in the art, since the distributing area of the plate upon the tie is considerably increased without increasing the bearing-surface of the rail upon the plate, while the extensions prevent the loosening of the plate by reason of its rocking sidewise as the load passing along the rail is brought first over one edge and then over the other edge of the plate.

I claim—

1. A tie-plate, having extensions projecting from its side edges, said extensions being thinner than the plate-body, and arranged to lie upon the upper face of the tie and reduce the rocking action of the plate when in place; substantially as described.

2. A tie-plate, of substantially the same thickness throughout its body, having side extensions with inclined or beveled upper faces, said extensions being arranged to lie upon the upper face of the tie and reduce the rocking action of the plate when in place; substantially as described.

3. A tie-plate having depending flanges and provided with thinner side extensions arranged to lie flat upon the upper face of the tie, and reduce the rocking action of the plate when in place; substantially as described.

In testimony whereof I have hereunto set my hand.

ANDREW MORRISON.

Witnesses:
H. M. CORWIN,
GEORGE B. BLEMMING.

No. 631,039. Patented Aug. 15, 1899.

W. GOLDIE.

TIE PLATE.

(Application filed June 12, 1899.)

(No Model.)

Fig. 1.

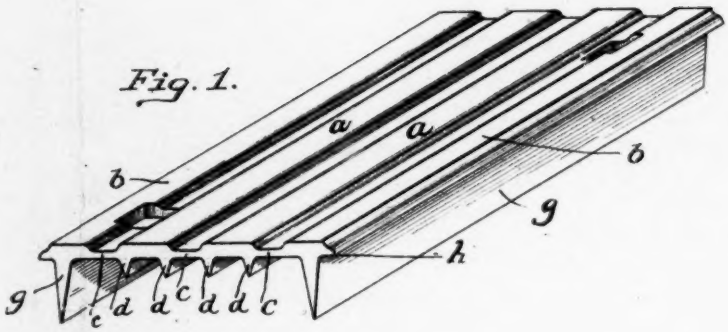
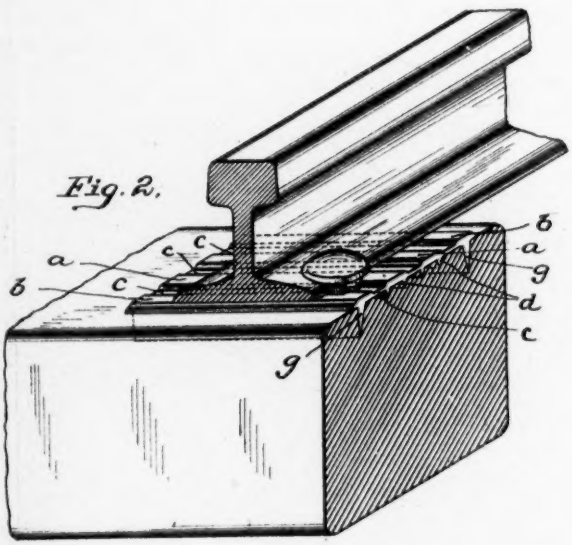


Fig. 2.



Witnesses:

Walter Famariss

Joseph C. Raymond

Inventor:

William Goldie

By Kay & Totten

Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM GOLDIE, OF PITTSBURG, PENNSYLVANIA.

TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 631,039, dated August 15, 1899.

Application filed June 12, 1899. Serial No. 720,276. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GOLDIE, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Tie-Plates; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to tie-plates, its object being to provide an efficient and cheap form of tie-plate for use with straight tracks or those where there is little curve, so that the lateral strain upon the rails is slight.

The invention relates to the same general class of tie-plates as shown in Patent No. 610,179, granted to me September 6, 1898. In that patent is shown a rail-sustaining plate having its body formed of two or more thick rigid rail-sustaining bars connected by one or more thin webs and downwardly-projecting flanges below and extending along the bars and adapted to enter the tie longitudinally of the grain thereof, the depending flanges, with the thick bars, forming, in effect, T-bars, while the thin webs reduce the weight of the plate, so that the thickness and stiffness of the bar portions thereof may be increased without increasing the weight of the plate.

The present invention has for its object to provide a tie-plate of increased strength by taking advantage of what might be termed a "channel-bar" construction; and it comprises, generally stated, a rail-sustaining plate having its body provided with one or more thick flat bar portions and two depending flanges below each such bar portion, one extending along each outer edge of the same, and thin webs connecting the thick bar portions of the plate. It also comprises certain other improvements, which will be more fully hereinafter set forth.

To enable others skilled in the art to make and use my invention, I will describe the ...e more fully, referring to the accompany-...drawings, in which—

...gure 1 is a perspective view of the plate, Fig. 2 shows the same with the rail rest-...hereon and the tie-plate embedded in ...e.

Like letters of reference indicate like parts in each figure.

The tie-plates are formed by rolling bars to the desired section, cutting them to length, and punching them. The plate has its body formed of the thick rail-sustaining bar or bars *a*, forming the inner bar or bars of the plate, and the outer thick rail-sustaining bars *b*, and these rail-sustaining bars lie horizontal and, together with the thin web portions *c*, form the body of the tie-plate. Each inner bar *a* has depending below the same two flanges *d d*, one such flange extending along each outer edge of the bar portion, so that such bar portion forms, with said flanges, in effect, a channel-bar and is stiffened not only by its thick body, but is further stiffened and braced by the two depending flanges, which largely increase the strength of the bar portion, as they brace it near its edges, and the two flanges in connection with each bar portion act together in bracing such bar portion. The depending flanges *d* being applied to the inner bars are preferably made shallow, so that they will not cut very deep into the tie-body, while they increase the adhesion of the plate to the tie and as they are not of any great depth will not break up or injure the tie-body. I prefer, however, to depend more largely on the deeper depending flanges of the outer bars *b* for the adhesive or holding powers of the plate, such outer flanges *b* being provided with deep thin sharp tie-entering flanges *g*, which extend along such bar portions *b* and take into the tie-body, so as to obtain a strong hold thereon. I also prefer to provide the body with the outwardly-extending flanges or lips *h*, which extend beyond the outer depending flanges *g*, so as to fully prevent the entrance of water or moisture into the seat formed in the tie by such flanges. As so constructed I am enabled to obtain a tie-plate in which the strength and rigidity of the inner thick rail-sustaining bars are increased, the deep outer depending flanges *g* serving to brace the outer bars *b*, while the depending flanges *d d* on each inner bar, though not of so great depth, serve to impart practically as great rigidity

on account of each bar portion carrying two such flanges, while the fear of destroying the tie by the inner depending flanges is overcome, as such flanges are short and do not sink any great depth into the tie.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A rail-sustaining plate having a body provided with a thick flat bar portion and two depending flanges below such bar portion, outer thick bar portions beyond the same and thin webs connecting such thick bar portions, substantially as set forth.

2. A rail-sustaining plate having a body provided with a thick flat bar portion and two depending flanges below such bar portion, one extending along each outer edge thereof, outer thick bar portions beyond the same and thin webs connecting such thick bar portions, substantially as set forth.

3. A rail-sustaining plate having a body provided with a thick flat bar portion and two depending flanges below such bar portion, outer thick bar portions and thin webs connecting the thick bar portions, the outer bar portions each having a single depending flange below and extending along the same, substantially as set forth.

4. A rail-sustaining plate having a body provided with a thick flat bar portion and two depending flanges below such bar portion, outer thick bar portions, and thin webs connecting the thick bar portions, the outer bar portions each having a single depending flange below and extending along the same, and of greater length than the depending flanges of the inner bar portion, substantially as set forth.

In testimony whereof I, the said WILLIAM GOLDIE, have hereunto set my hand.

WILLIAM GOLDIE.

Witnesses:
G. C. RAYMOND,
ROBERT C. TOTTEN.

31 & 2082

EXHIBIT S57.

KATE S. HOLMES,
Notary Public

1329

No. 631,873. Patented Aug. 29, 1899.

G. K. KINNEY & S. L. TRUEBLOOD.

RAILWAY TIE PLATE.

(Application filed Mar. 29, 1899.

No Model.)

Fig. 1.

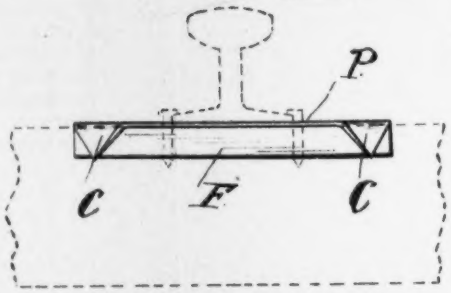


Fig. 3.

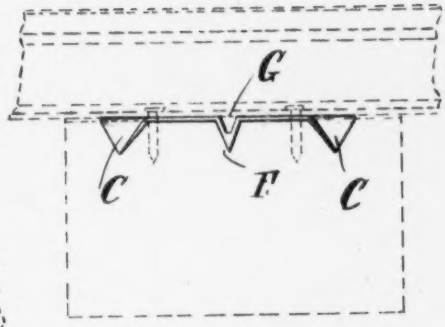


Fig. 2.

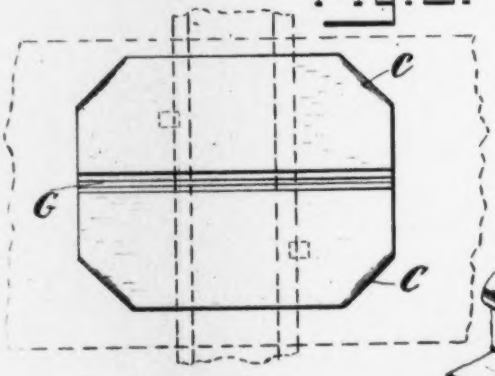
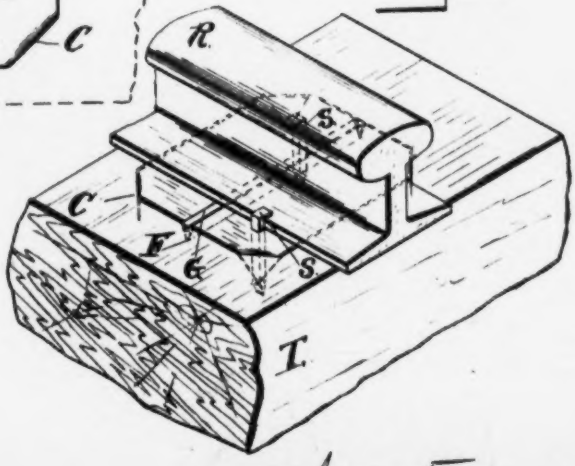


Fig. 4.



Witnesses
Grace Fern
Blanche Fern

Inventors
George K. Kinney
Samuel L. Trueblood
By W. E. Williams
Atty.

1330

UNITED STATES PATENT OFFICE.

GEORGE KILBURN KINNEY, OF CHICAGO, ILLINOIS, AND SAMUEL LEONARD TRUEBLOOD, OF WELDON, NORTH CAROLINA.

RAILWAY-TIE PLATE.

SPECIFICATION forming part of Letters Patent No. 631,873, dated August 29, 1899.

Application filed March 29, 1899. Serial No. 710,911. (No model.)

To all whom it may concern:

Be it known that we, GEORGE KILBURN KINNEY, a resident of Chicago, Cook county, State of Illinois, and SAMUEL LEONARD TRUEBLOOD, a resident of Weldon, Halifax county, State of North Carolina, citizens of the United States of America, have invented certain new and useful Improvements in Railway-Tie Plates, of which the following is a specification.

The object of the invention is to provide a tie-plate which combines a maximum of effectiveness with a minimum of cost.

In the drawings, Figures 1, 2, and 3 are respectively end, plan, and side views of the novel tie-plate, the rail and tie being indicated in dotted lines. Fig. 4 is a perspective view showing the tie, plate, rail, and spikes in position.

The office of a tie-plate being to distribute the load over a larger portion of the tie's surface to protect the tie from wear under slight movements of the rail and to aid the spikes in resisting strains, it is evident that there should be no relative movements of the plate and tie, for if the plate moves upon the tie it can at best serve only to distribute the load. Our plate, although less expensive than most others, secures all the desired results, successfully resisting all strains without loosening when subjected to ordinary use.

In the drawings, P designates the plate; R, the rail; T, the tie, and S the spikes. In general outline the plate is rectangular and appears like a plane rectangular place of uniform thickness, having its corner portions bent at angles of about forty-five degrees, with its margins into planes perpendicular to the plane of the plate, and also having its central portion bent sharply downward to form a V-shaped groove along the line of its longer axis. The plate thus has four pointed downwardly-turned flanges C and a downwardly-projecting V-shaped rib F transverse to the direction of the rail when the plate is in use. The plate is further provided with suitable apertures for spikes, and the points of the flanges and the edge of the rib are made as sharp as the method of construction conveniently permits, so that all may readily enter the tie. Obviously when forced into the tie each wedges firmly in place and the flanges, owing to their peculiar oblique positions, are never thrust edgewise, but always offer a large resisting area whatever the direction in which displacing force may act. The rib being transverse to the direction of the rail prevents springing of the plate and distributes the strain from end to end of the plate and longitudinally with respect to the tie.

In practical use we have found this plate lighter, less expensive, and more efficient than other plates for the same general purpose.

What we claim is—

1. A tie-plate having its body in the form of an approximately rectangular plane plate perforated within its margins for the passage of spikes and with its four corners turned downward at right angles.

2. A tie-plate approximately rectangular in general outline, having its four corners turned downward at right angles, an axial V-shaped rib upon its lower surface, and perforations for the passage of spikes, substantially as set forth.

3. A tie-plate of the class described having the longitudinal central V-shaped rib below, the corresponding groove above, and the triangular flanges depending at an angle with the plate's margins, substantially as set forth.

GEORGE KILBURN KINNEY.
SAMUEL LEONARD TRUEBLOOD.

Witnesses as to George Kilburn Kinney:
GRACE FERN,
BLANCHE FERN.
Witnesses as to Samuel Leonard Trueblood:
HENRY UDRIET,
JNO. B. MINOR.

1332

No. 636,607. Patented Nov. 7, 1899.

B. WOLHAUPTER.

RAILWAY TIE PLATE.

(Application filed Oct. 24, 1896.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

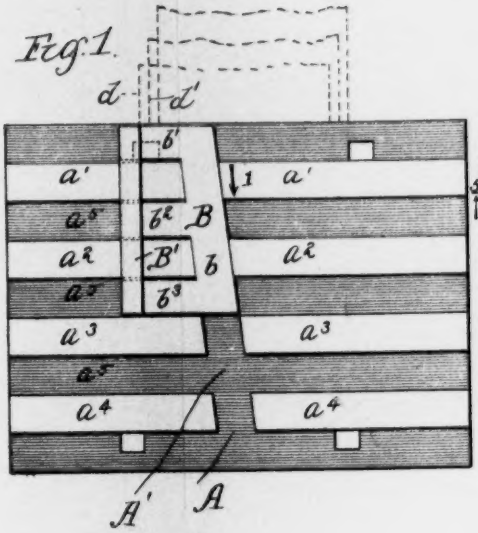


Fig. 4.

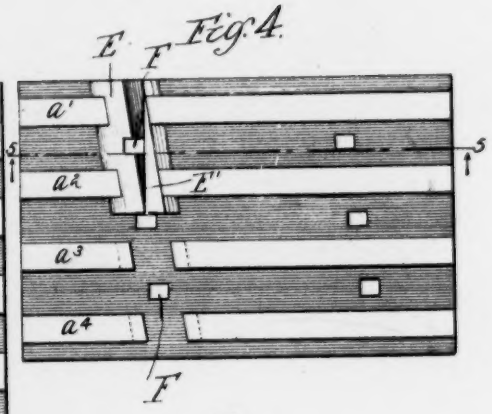


Fig. 6.

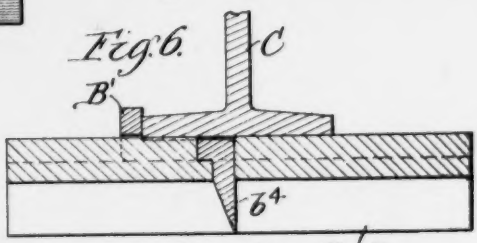


Fig. 5.

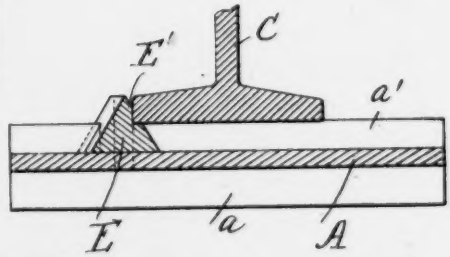


Fig. 2.

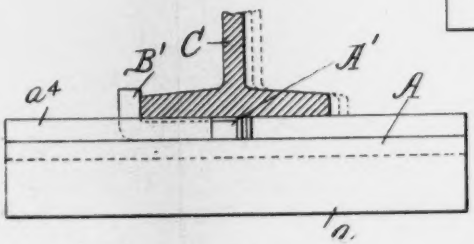


Fig. 3.

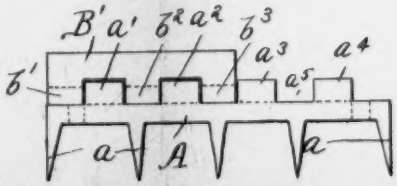
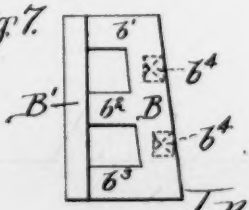


Fig. 7.



Witnesses.

Wm. M. Rheem.

Ellen L. Fleming.

Inventor,

by Benjamin Wolhaupter

Walter H. Chamberlain

TORN PAGE

1333

No. 636,607. Patented Nov. 7, 1899.

B. WOLHAUPTER.

RAILWAY TIE PLATE.

(Application filed Oct. 24, 1896.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 8.

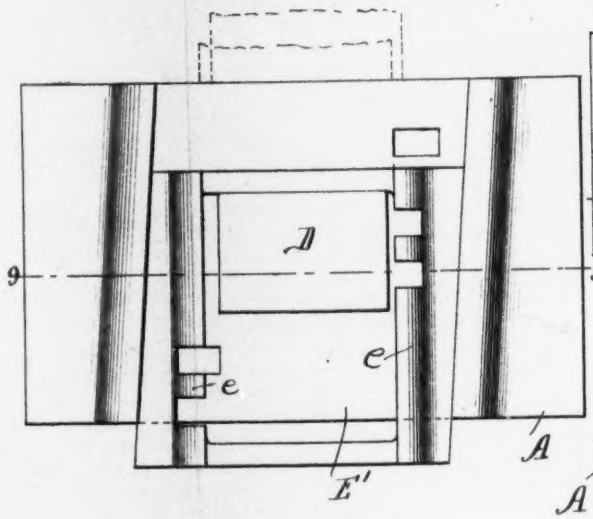


Fig. 10.

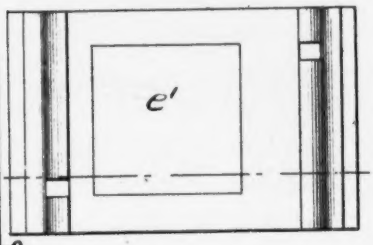


Fig. 11.

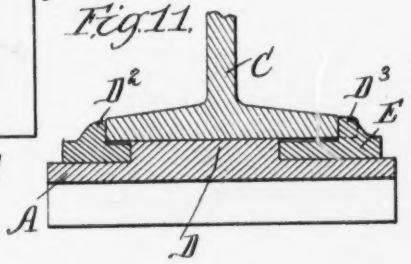


Fig. 9.

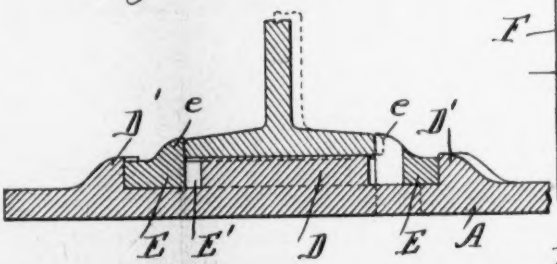


Fig. 12.

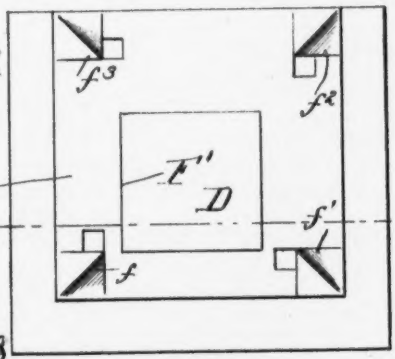
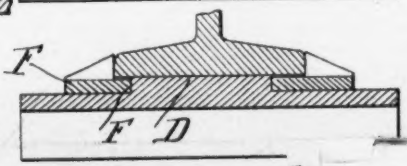


Fig. 13



Witnesses.
Wm. M. Rheem.
Wm. F. Fleming

Inventor.
by Benjamin Wolhaupter
Walter H. Chamberlain Atty

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UNITED STATES PATENT OFFICE.

BENJAMIN WOLHAUPTER, OF CHICAGO, ILLINOIS.

RAILWAY-TIE PLATE.

SPECIFICATION forming part of Letters Patent No. 636,607, dated November 7, 1899.

Application filed October 24, 1896. Serial No. 609,878. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN WOLHAUPTER, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented a certain new and useful Improvement in Railway-Tie Plates; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to that class of railway-tie plates wherein is provided some sort of adjustment whereby the rail may by the adjustment of the plate be returned to its normal gage after the gage has been widened by the constant passage of trains or for other reasons. Heretofore in the construction of these adjustable plates it has been customary to provide integral with the plate a rail-abutting flange and to make the plate adjustable on the tie. With this mode of adjustment the plate is necessarily lifted out of the tie and therefore loosened from it. It has been found by experience, however, that it is very injurious to the tie for a tie-plate to be loosened. In other words, in all successful plates they become part and parcel of the ties themselves, and loosening them for adjustment is therefore objectionable.

My present invention contemplates a construction wherein the plate having been once set or applied to the tie is not disturbed when the adjustment is effected; but the rail-abutting flange, instead of being made integral with the plate, is separable therefrom and adjustable thereon, so that when the plate has been set to the original gage and the constant passage of the trains has moved the plate along the tie, and thus widened the gage, instead of removing the plate it is only necessary to adjust the rail-abutting flange, and thus carry the rail back to the normal gage.

The invention consists in a combination of devices and appliances hereinafter described [illegible] 1.

and claimed. awings, Figure 1 is a plan view of

In the dr odying my invention. Fig. 2 is a plate emb ation of the plate, showing a portion an edge elevrail in section. Fig. 3 is an edge tion of the of the plate at right angles to Fig. elevation.

2. Fig. 4 is a plan view of a variation. Fig. 5 is a sectional view on the line 5 5 of Fig. 4. Fig. 6 is an end elevation, with parts in section, of a variation. Fig. 7 is a plan view of the same. Fig. 8 is a plan view of still another form of plate embodying my invention. Fig. 9 is a sectional view on the line 9 9 of Fig. 8. Fig. 10 is a plan view of the upper plate embodied in a form slightly varied from the construction shown in Fig. 8. Fig. 11 is a sectional view on the line 11 11 of Fig. 10. Fig. 12 is a plan view of still another form of upper plate. Fig. 13 is a sectional view on the line 13 13 of Fig. 12.

In carrying out the invention, A represents the plate proper, preferably, although not necessarily, provided on its under side with flanges a, more or less sharpened to adapt them to enter the tie and hold the plate in the desired position. It is obvious that the plate may or may not be provided with these flanges and that they may, if provided, extend either parallel with the grain of the tie or across the grain of the tie, and it is also obvious that instead of flanges other tie-engaging devices might be provided. The top of the plate shown in Figs. 1, 2, and 3 is provided with a series of ridges a', a^2, a^3, and a^4. These flanges may of course be increased or decreased in number, depending on the width of the plate. Cut through these flanges on a diagonal line is a channel A'. B is what I will term the "adjustable rail-abutting flange." It is formed with a portion b, adapted to lie in the channel A', and with portions b' b^2 b^3, adapted to lie in the channels a^5 between the ridges a' to a^4. The rail-abutting flange B has an upward-turned flange B', that directly receives the lateral thrust of the rail C. The method of using the plate may be described as follows: Suppose it is originally laid with the adjustable flange B located as shown in Fig. 1. Now we will suppose that the constant pounding of the passing trains moves the plate, say, the distance between the dotted lines d and d', or suppose the rail-head wears and widens the gage the distance between the dotted lines d d'. The rail is lifted until adjustable flange B can be lifted clear of the flanges a' a^3 a^5, and the flange B is then moved in the direction of the arrow 1, Fig. 1, until the portion b^3 rests in the space

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a^3 between the flanges a^2 and a^4. This carries the rail laterally the distance between the dotted lines d d', or, in other words, restores the rail to its normal gage of track. Still another adjustment may be gained by carrying the rail-abutting flange B another notch in the direction of arrow 1 until the flange b^3 rests at the edge of the plate. It will be observed that the rail-abutting flange B does not carry the weight of the rail at all, as the latter rests upon the flanges a' to a^4, and yet the rail-abutting flange B is firmly locked in position because it is below the rail C and is prevented from lateral movement by the portion b abutting the ends of the flanges a' to a^4. In Figs. 4 and 5 I have shown a slight variation in the form of the rail-abutting flange in that instead of the upward-turned flange B' being above the flanges a' to a^4 the flange is so shaped that its base is dovetailed under the flanges a' to a^4 and the flange which directly receives the thrust of the rail projects up directly from the body of the flange as a whole. The rail-abutting flange as a whole is marked E, and the flange which directly receives the thrust of the rail is marked E'. In this form (shown in Figs. 4 and 5) the flange E is held against longitudinal movement by the spike passing through it and into the tie, and this flange E can therefore be adjusted any desired distance, depending upon the distance between the spike-holes F.

In Figs. 6 and 7 I have shown a slight variation in the form of the abutting flange B B' in that it is provided with depending projections or spikes b^4, which pass through suitable orifices in the plate A and enter the tie, thus serving not only to hold the flange B B' in place, but also the plate itself.

In Figs. 8 to 13, inclusive, I have shown a form of plate and adjustable flange differing quite materially from the construction shown in Fig. 1, but still embodying the same idea of an adjustable rail-abutting flange on a main plate. In these latter constructions, however, I have really provided a main plate which is engaged to the tie and a superimposed adjustable plate carrying the rail-abutting flange.

I will now describe these latter constructions. As in the former figures, A represents the main plate, which is provided with a central boss or elevation D, which directly carries and bears the rail. This main plate is also provided with flanges D'. E is another plate provided with the flanges e and with a central opening E', adapted to embrace the boss D. It will be observed with reference to Fig. 8 that the ridges or flanges D' are not parallel with the length of the rail, but are parallel with each other and are arranged on a plane at a greater or less angle with the longitudinal plane of the rail. It will also be observed that the ridges e are parallel with the longitudinal plane of the rail and are substantially far enough apart to embrace the rail between them. Again, it will be observed that the plate E is embraced between the flanges D', and the edges of the plate E are so arranged or cut as to have their planes parallel with the flanges d' when the flanges e are parallel with the rail. Thus it will be seen that with the rail resting on the boss D and embraced by the flanges e if the plate A is stationary on the tie and the plate E is moved in a direction parallel with the rail it will shift the rail in either lateral direction, according to the longitudinal direction in which the plate E is shifted. An adjustment of the rail-abutting flange e is thus obtained and the same results accomplished as in the construction set forth on Sheet 1. In Figs. 10 and 11 I have shown a construction wherein there is the same boss D as in Figs. 8 and 9; but the shape of the upper plate E is somewhat differently the opening e' therein being substantially the same size and shape as the boss D, and the plate is provided with the rail-abutting flanges D^2 D^3, which embrace the rail. The adjustment is obtained by making the flange D^2, we will say, nearer the opening E' than the flange D^3, so that if the rail is set to the proper gage originally it is afterward shifted by raising the rail and reversing the position of the plate E end for end. Thus the rail is moved laterally with respect to the main plate A without disturbing the latter. In Figs. 12 and 13 there is substantially the same construction as shown in Figs. 10 and 11, except that instead of reversing the plate E end for end, and thus obtaining a single adjustment, the upper plate in the construction shown in Figs. 12 and 13 can be revolved a quarter-turn and three adjustments thus obtained. This is accomplished by making the upper plate F with an opening F', that fits over the boss D, and providing the plate F with abutments f f' f^2 f^3 and making these abutments variable distances from the opening E', so that when the rail is elevated and the plate E is revolved a quarter-turn it will bring a different pair of abutments f to f^3 against the edges of the rail than previously held the rail.

It will thus be seen that in each of the above-described constructions when the plate has once been laid on the tie and from the pressure of the passing trains has become embedded in and made a part and parcel of the tie even though it is thrust laterally by the thrust of the rail it need not be withdrawn from the tie to adjust the rail; but the rail-abutting flange can be adjusted, leaving the body of the plate practically integral with the tie and in much better shape to resist lateral thrust of the rail than as though it had been loosened and moved. It is obvious that the form of the rail-abutting flange may be varied materially without departing from the spirit of my invention—as, for instance, it might be so shaped as to have an upturned flange for both sides of the rail, or the rail-abutting flange might be en-

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the body of the plate in many different ways, since the essential feature of the invention lies in the provision of a rail-abutting flange which instead of being integral with the body of the plate is adjustable thereon.

I would at this point call attention to the fact that in no one of the constructions above described is the weight of the rail borne by the rail-abutting flange, but that in each instance the rail rests directly on the plate proper and is simply held against lateral shifting by the rail-abutting flange.

What I claim is—

1. A railway-tie plate consisting of a plate proper adapted to sustain the rail and adapted to be engaged to the tie and a rail-abutting flange or projection engaged to said plate but adjustable bodily thereon, substantially as described.

2. A railway-tie plate consisting of a plate proper adapted to sustain the rail and adapted to be engaged to the tie and a rail-abutting flange or projection located above the plate and engaged to said plate but adjustable bodily thereon, substantially as described.

3. A railway-tie plate consisting of a plate proper adapted to sustain the rail and having tie-engaging devices on its under side and a rail-abutting flange or projection engaged to its upper side said plate and rail-abutting flange or projection engaged together but said flange adjustable bodily on said plate, substantially as described.

4. A railway-tie plate consisting of a plate proper adapted to sustain the rail and having a tie-engaging device on its under side extending parallel with the grain of the tie and a rail-abutting flange or projection engaged to its upper side, said plate and rail-abutting flange or projection engaged together but said flange adjustable bodily on said plate, substantially as described.

5. A railway-tie plate consisting of a plate proper having tie-engaging devices on its under side and a rail-abutting flange or projection engaged to the upper side, a portion of said rail-abutting flange or projection being below the rail but above the plate, substantially as described.

6. A railway-tie plate consisting of a plate proper having tie-engaging devices on its under side and a rail-abutting flange or projection engaged to the upper side, a portion of said rail-abutting flange or projection being below the rail but above the plate, said flange being adjustable on the plate, substantially as described.

7. A railway-tie plate consisting of a plate proper adapted to be engaged to the tie and a rail-abutting flange or projection engaged to the upper side of the plate and adjustable with respect thereto, said plate also provided with a stationary projection or projections on its upper side adapted to carry the weight of the rail, substantially as described.

8. A railway-tie plate consisting of a plate proper provided with one or more upwardly-projecting ridges or flanges adapted to carry the weight of the rail and a rail-abutting flange or projection separate from the rail-sustaining flange but engaged and held from lateral thrust thereby, substantially as described.

9. A railway-tie plate consisting of a plate proper provided with one or more upwardly-projecting ridges or flanges adapted to carry the weight of the rail and a rail-abutting flange or projection separate from the rail-sustaining flange but adjustably engaged and held from lateral thrust thereby, substantially as described.

10. A railway-tie plate consisting of a plate proper provided with a series of rail-sustaining flanges, a diagonal channel extending through said flanges and a rail-abutting flange having a portion to receive the lateral thrust of the rail and another portion to rest in said diagonal channel, substantially as described.

11. A railway-tie plate consisting of a plate proper a rail-abutting flange or projection separate therefrom but engaged thereto, said flange or projection provided with a depending projection or spike adapted to pass through the plate and into the tie, substantially as described.

12. A railway-tie plate consisting of a plate proper a rail-abutting flange or projection separate therefrom but adjustably engaged thereto said flange or projection provided with a depending projection or spike adapted to pass through the plate and into the tie, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

BENJAMIN WOLHAUPTER.

Witnesses:

DE WITT W. CHAMBERLIN,

ESTHER M. ROTHELLE.

1338

No. 636,982. Patented Nov. 14, 1899.

W. C. HANNA, Jr.

BEAM SHOE.

(Application filed Dec. 30, 1898.)

(No Model.)

Fig. 1.

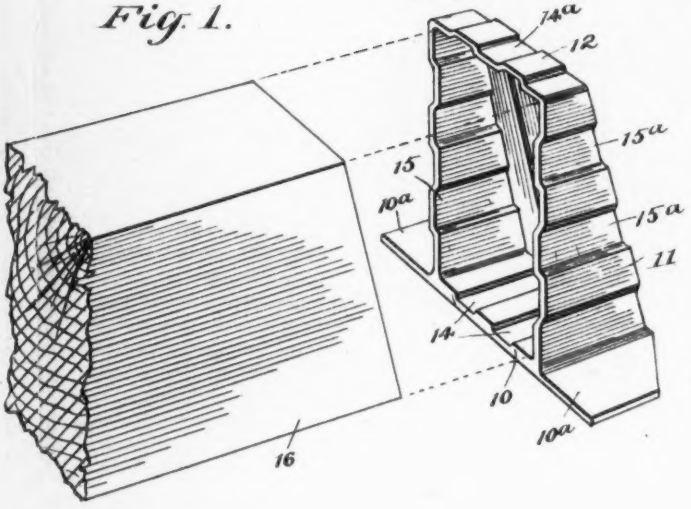


Fig. 2.

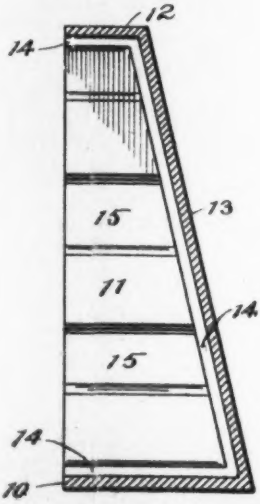


Fig. 3.

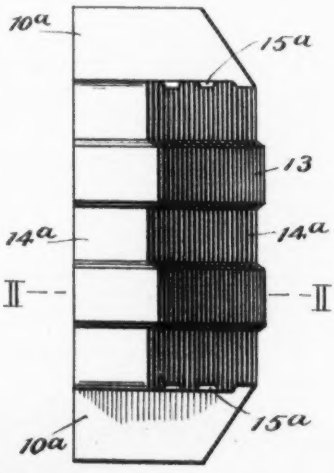
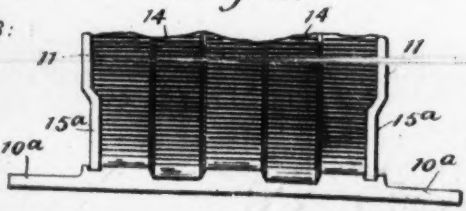


Fig. 4.



WITNESSES:

H. J. Criswell.

C. A. Cowley.

INVENTOR

William C. Hanna Jr.

BY

Hutchinson & Criswell.

ATTORNEYS.

POOR COPY

UNITED STATES PATENT OFFICE.

WILLIAM C. HANNA, JR., OF NEW YORK, N. Y., ASSIGNOR TO JOSEPH W. FISKE, OF SAME PLACE.

BEAM-SHOE.

SPECIFICATION forming part of Letters Patent No. 636,982, dated November 14, 1899.

Application filed December 30, 1898. Serial No. 700,757. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. HANNA, Jr., of the city, county, and State of New York, have invented certain new and useful Improvements in Beam-Shoes, of which the following is a full, clear, and exact description.

My invention relates to improvements in beam-shoes—that is, to that class of devices which are used to sustain the ends of beams or timbers—the shoe being supported in a chimney or other wall.

One object of my invention is to produce an extremely cheap and simple device of this character which can be cast in one or more pieces, which has base-flanges adapted to be embedded securely in the wall, which has interior air-channels sunk in the side and end walls in such a way as to effect a perfect air circulation around the beam end, thus rendering it unlikely that the beam shall catch fire from any heat in an adjacent chimney or decay by dry rot, and which has exterior corrugations or channels adapted to get a firm grip on the adjacent brick and mortar or other material of the wall.

Another object is to provide a device of this character which can be conveniently cast of a shape to fit the beam end as it is usually made and to afford an extremely firm and safe support for the same.

To these ends my invention consists of a beam-shoe the construction and arrangement of which will be hereinafter described and claimed.

Figure 1 is a perspective view of the beam-shoe embodying my invention and shows also an adjacent beam end in position to be pushed into the beam-shoe. Fig. 2 is a vertical section on the line 2 2 of Fig. 3. Fig. 3 is a plan view of the device, and Fig. 4 is a broken front view of a modification of the invention.

Obviously the device can be made of any suitable material; but it is preferably made of cast-iron, and if good strength is required the casting should be malleable.

The device has a bottom 10, which is projected to form the side flanges 10^a, and springing upward from the bottom are the parallel sides 11 of the shoe, which connect with the top 12. The shoe has an inclined back wall 13, (shown in Figs. 2 and 3,) and it will be seen, especially by reference to Fig. 2, that a pocket is thus formed which is open in front and which is comparatively broad at the bottom and narrow at the top, thus adapting it to receive the end of a beam 16, as it is known that such beams are usually beveled off at the ends.

The main object of my invention is to protect the beam from adjacent heat in chimneys or hot-air flues, and to this end the shoe has air-channels 14, which begin at the bottom and run inward to the back, thence up the back, and finally out at the top, as the drawings clearly show. Thus it will be seen that there is a free circulation around the beam end, and to further protect the beam the shoe has side channels 15, which run along the inner side walls to the back.

In casting the shoe it is desirable to have the metal of practically an even thickness, and this can be done by making a series of exterior grooves 14^a and 15^a, these coming at points on the outer wall opposite the spaces lying between the air-channels on the inner wall. Thus the outer wall, as well as the inner, is given a corrugated effect, so that when the brick and mortar are built around the shoe the mortar enters the grooves and the shoe is held securely in place, particularly when it is considered that the flanges 10^a are embedded also in the wall.

From the foregoing description it will be evident that this device is of the simplest character, that it is extremely cheap, and that it is admirably adapted to support a beam end and keep the said end as cool as possible.

In Fig. 4 is shown a slightly-modified form of the device, which is especially adapted for use on large beams and which is like the shoe already described, except that the top part of the device is separable from the base 10 at the point where the two parts join, as the drawing clearly shows. It is an evident fact that if the device is made separable it may be divided on other lines without affecting the invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A device of the character described,

comprising a shoe having one open side, a base-flange and interior air-channels extending along the bottom from the front edges to the back, thence up the back and out at the top edge, substantially as described.

2. As an improved article of manufacture, a beam-shoe provided with air-channels extending from the front edge inward on the bottom wall, thence upward along the back walls and finally outward along the top wall, substantially as described.

3. As an improved article of manufacture, a beam-shoe provided with interior air-channels sunk in the walls thereof and extending from the edges inward, and exterior corrugations and grooves, the said exterior corrugations being formed opposite the interior grooves, substantially as described.

4. As an improved article of manufacture, a beam-shoe having inner air-channels providing an air circulation around the end of a beam when contained in the shoe, and a series of alternating grooves and corrugations formed in the outer wall, substantially as described.

WILLIAM C. HANNA, JR.

Witnesses:
CHARLES F. DAVIES,
STACY R. HILLS.

103 & 2104 EXHIBIT S60.

KATE S. HOLMES,
Notary Public.

No. 649,629.

Patented May 15, 1900.

R. B. CHARLTON.

RAILWAY TIE PLATE.

(Application filed Apr. 17, 1899.)

(No Model.)

Fig. 1.

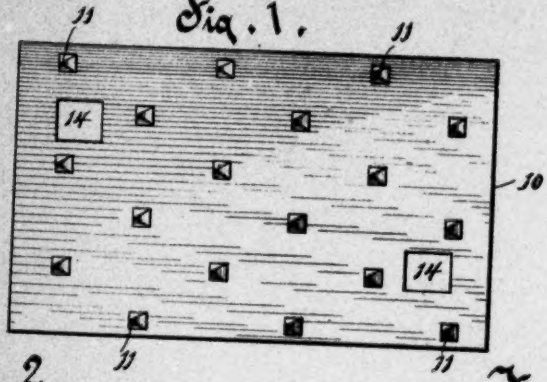


Fig. 2.

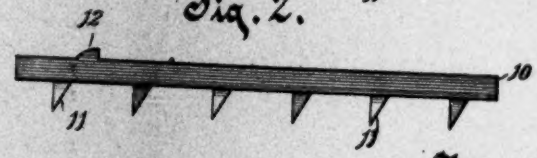


Fig. 3.

Fig. 4.

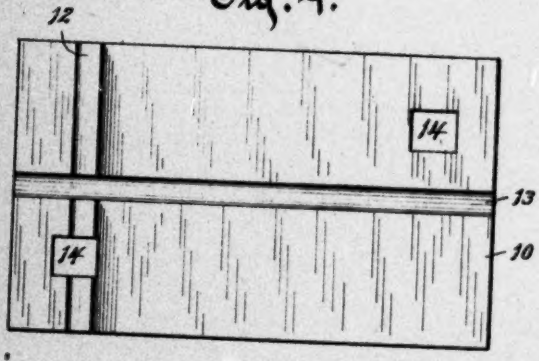


Fig. 5.

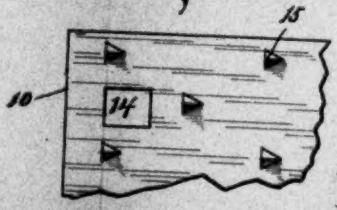


Fig. 6.

Fig. 7.

Witnesses.

A. Kenny.

Inventor.

Richard B. Charlton.

By Benedict & Morsell

Attorneys.

UNITED STATES PATENT OFFICE.

RICHARD B. CHARLTON, OF MILWAUKEE, WISCONSIN.

RAILWAY-TIE PLATE.

SPECIFICATION forming part of Letters Patent No. 649,629, dated May 15, 1900.

Application filed April 17, 1899. Serial No. 713,274. (No model.)

To all whom it may concern:

Be it known that I, RICHARD B. CHARLTON, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Railway-Tie-Plates, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention relates to improvements in tie-plates that are adapted to be placed on wood ties to support steel railway-rails thereon. In railway chairs or tie-plates for the purpose stated it is desirable to have the plates made as light in weight as is possible, while yet being so strong and enduring as to be incapable of being broken or distorted by the pounding and wear thereon caused by the running of heavy trains over them on the rails; to have the plates so constructed as to be capable of ready application to the surface of the wood ties and when so applied to so surely engage the ties as not to be liable to slide thereon, especially in the direction of the thrust produced by the travel of trains over the rails thereon, and in such engagement with the ties to not destroy the texture or material of the tie beyond what is absolutely necessary to obtain such secure engagement therewith; to also provide means for preventing the movement of the rail thereon laterally under the thrust of the train; to provide a means for gathering and removing sand that might otherwise get between the plate and the thereon-supported rail and produce undesired abrasion thereof, and, finally, to provide opportunity for spiking, and thereby securing the rail and the plate permanently to the tie.

The object of my invention is to provide such improvements in tie-plates as to most successfully and satisfactorily secure the desired qualities and purposes above stated.

My invention consists of the tie-plate, its parts, and combinations of parts, as herein described and claimed, or their equivalents.

In the drawings, Figure 1 is a view of the under side of my improved tie-plate. Fig. 2 is a view of the edge of the tie-plate at one side. Fig. 3 is a view of the end of my improved tie-plate. Fig. 4 is a top view of the improved tie-plate. Figs. 5, 6, and 7 are respectively views of the under sides of modified forms of my improved tie-plate.

In order that the tie-plate while being sufficiently strong and unyielding for the purpose for which it is intended may yet be as light in weight as possible, it is desirable to construct the plate of rolled metal. In order that such a plate be constructed at a minimum of expense, it must be so formed in all its parts that it can be made and finished by passing the bar or plate of metal of which it is made through the properly-designed rolls of a rolling-mill. In a plate so constructed there can be no overhanging or undercut parts, and all parts projecting much from the principal surfaces of the plate must have a certain amount of inclination or bevel for the proper "draw" of the metal from the rolls.

In the drawings, 10 is the tie-plate, the body or principal member of which is preferably of even thickness and of substantially-rectilinear form. On this plate 10 and projecting from the under surface thereof there are a number of spurs 11 11, constructed integrally therewith under the pressure of the rolls in the rolling of the plate and preferably formed with a flat face projecting at a substantially right angle from the surface of the plate, the other sides of the spurs being beveled or inclined outwardly from a point at the middle of the outer edge of the flat front surface of the spur, thus forming a spur having considerable thickness at its base, where it joins with the plate 10. Spurs thus made, as shown in Figs. 1, 2, and 3, are of a pyramidal form, with one flat face at a right angle to the other surfaces of the plate. These spurs are preferably so arranged on the plate 10 that they occur in series transversely of the plate, the front flat vertical faces of the spurs of each series being in a right line across the plate. These spurs, formed in the manner described, are adapted when the plate is placed on a wood tie with these spurs downwardly to be readily forced into the fiber of the wood with the minimum of destruction to the fiber of the tie, and when thus forced into the tie they present their flat vertical faces against the grain of the wood in the direction against which greatest resistance is desired—that is, in the direction against which the thrust of the moving train on the rails tends to push them.

On the top surface the plate is provided

with a transverse flange 12, adapted to receive against it the base-flange of a railway-rail and prevent its movement thereon laterally in a direction toward the nearest end of the plate. In the top surface of the plate and at a right angle to the direction of the flange 12 there is a groove 13, adapted to gather therein the sand that accumulates on the top of the plate and permit of its escape or removal from the plate. Spike-holes 14 14 are provided in the plate, through which spikes may be driven into the tie, which spikes may be of the kind in common use, that are provided with heads adapted to engage the base-flange of the rail and hold it and the tie-plate securely in position on the tie. In use these tie-plates are advisably placed on every tie underneath the rail, the flange 12 being placed at the outside of the rail or, if preferred, alternately at the outside and at the inside of the rail, thus alternating the direction of the facing of the spurs 11 on the ties under the rail, but advisably both in the same direction on the same tie.

In Fig. 5 a modified form of spur 15 is shown, in which the base of the spur is triangular in cross-section, but the spur has its vertical front face, the other two sides being beveled to a point centrally on the flat vertical face. In Fig. 6 a fragment of my improved plate is shown, in which there is another modified form of the spurs 15', in which there is a front flat vertical wall and a circular or semicone shaped exterior surface.

In Fig. 7 still another modified form is shown, in which the spurs 16 and 16' have all their walls inclined inwardly or beveled from the base to a central apex. This form of construction can also be readily produced in rolling out the plate and can be easily applied to the tie with a minimum of injury to its fiber, while in most cases the spurs will engage the tie with sufficient persistency to surely hold the tie and rail thereon in position.

What I claim as my invention is—

1. A railway-tie plate consisting of a rolled-metal plate produced by rolling and as so rolled having a plurality of spurs integral with the plate projecting from the under surface thereof and severally terminating outwardly in a point each spur having a flat front face substantially at a right angle to the surface of the plate, the remaining wall or walls of the spur being beveled from the apex of the front face to the surface of the plate away from the flat front face forming a base of considerable extent in cross-section, the front flat faces of the spurs all facing in the same direction, said plate being provided in its upper surface with a transversely-disposed sand-groove.

2. An article of manufacture consisting of a rolled-metal plate, a plurality of pointed spurs projecting integrally from the under surface of the plate, a transverse flange on the upper surface of the plate adjacent to one end thereof, said plate being provided with a sand-groove in its upper surface at a right angle to said flange, and with a plurality of spike-holes through the plate.

3. An article of manufacture consisting of a rolled-metal plate, a plurality of pointed pyramidal spurs projecting integrally from the under surface of the plate arranged in right lines transversely of the plate, said plate being provided with spike-holes and a sand-groove, and a rail-retaining flange on its upper surface.

In testimony whereof I affix my signature in presence of two witnesses.

RICHARD B. CHARLTON.

Witnesses:
C. T. BENEDICT,
ANNA V. FAUST.

109 & 2110

EXHIBIT S61.

KATE S. HOLMES,
Notary Public.

1346

No. 662,850. Patented Nov. 27, 1900.

H. W. AVERY.

TIE PLATE.

(No Model.)

(Application filed Jan. 5, 1900.)

Fig. 1.

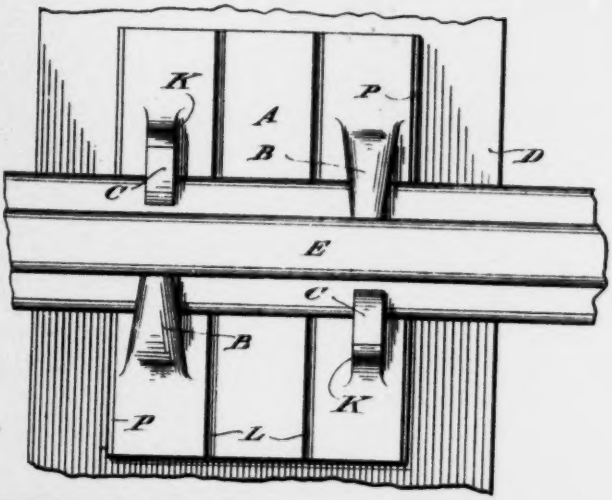


Fig. 2.

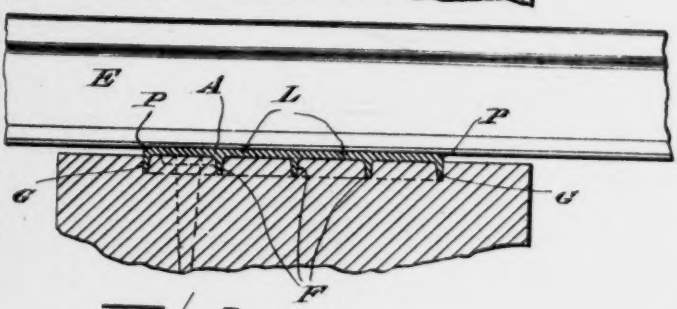
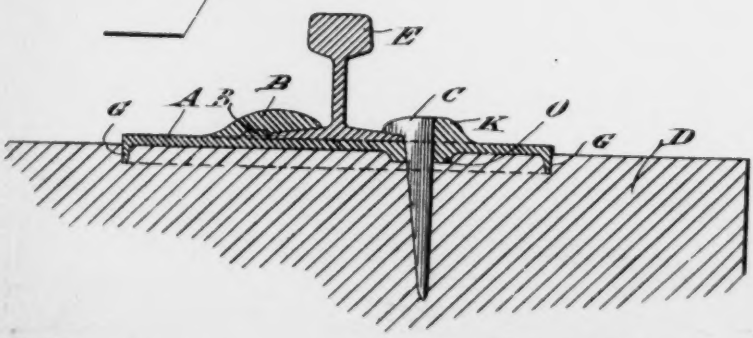


Fig. 3.



Witnesses
F. D. Ammen
H. M. Wise.

Inventor
Henry W. Avery,
By his Attorneys,
Thurston & Bates

UNITED STATES PATENT OFFICE.

HENRY W. AVERY, OF CLEVELAND, OHIO.

TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 662,850, dated November 27, 1900.

Application filed January 5, 1900. Serial No. 433. (No model.)

all whom it may concern:

Be it known that I, HENRY W. AVERY, a
zen of the United States, residing at Cleve-
d, in the county of Cuyahoga and State of
io, have invented a certain new and useful
provement in Tie-Plates, of which the fol-
ing is a full, clear, and exact description,
ference being had to the accompanying
wings.

My invention relates to railroad-tie plates;
d its object is to provide a strong, durable,
efficient tie-plate which may be readily
d cheaply manufactured.

In construction it consists, essentially, of
anged plate forming approximately a shal-
inverted box, which is provided with lugs
ngage the rail-flange and spike-holes for
ening it to the cross-tie, all of which will
more fully described hereinafter and defi-
ely set forth in the claims.

Figure 1 is a plan of a rail with my device
plied as in practice. Fig. 2 is a vertical
ss-section of the tie-plate and tie in the
ne of the axis of the rail. Fig. 3 is a cross-
tion taken at right angles to the axis of
rail and passing through a lug and spike-
e.

The device is adapted to be formed of cast-
.

In the drawings, A represents my tie-plate.
s a rectangular plate which may be flat or
ved on its upper side, and it carries two
s B B, located at opposite sides of a cen-
line of the plate and close to opposite
s thereof. These lugs may project to-
d the central line of the plate, as shown,
hich case they are adapted to engage the
ges of the rail E and prevent a displace-
t of the rail. As to an exact shape of
e lugs I do not confine myself. In some
s I may make the lugs simply vertical
ections, as indicated by dotted lines in
3, to prevent lateral displacement only
rail, or I may project the lug toward
e rail, so as to give the cavity formed be-
eath it approximately the shape of the rail-
nge to insure better engagement and to op-
se any tendency of the rail to rise. The
tter form is the one shown by full lines in
e drawings. Holes are also formed in the plate, preferably at points directly opposite the lugs, to receive the spikes C C, which are driven therethrough and into the cross-tie D.

On the under side of the tie-plate is formed a narrow marginal flange G, which projects vertically downward and extends completely around the tie-plate and has a more or less sharp lower edge. Extending from end to end of the plate are a plurality of parallel downwardly-extending webs F, which are approximately of the same depth and form as the marginal flange G and connect with it at their ends.

On the upper side of the plate may be formed a plurality of shallow depressions L, running at right angles to the direction of the rail and intended to facilitate the drainage of water from the plate. As will be seen from the drawings, I place the spike-holes close to the edges of the rail-flange, so that the spikes hold the rail against the lug B and in the recesses below the lug. I also form small lugs K upon the upper side of the plate, immediately back of the spikes, to brace them, and bosses O are made on the lower side, around the spike-holes, to give additional strength. The opposite edges of the plate lying at right angles to the rail are given a slight bevel B.

In applying my device to a rail one of the lugs B, if made as shown, will be hooked over the flange, the rail then lying in an inclined line between the other lug B and its opposite spike-lug. The plate is then swung around until the other lug B embraces the flange, the inner profile of the lugs B being such that the flanges will come to a snug fit in the position of the plate shown in the drawings. The spikes are now driven.

The advantages of the invention are evident. The vertical webs below the plate are really trusses across the rail whereby greater strength is given to the plate at the same time that the weight is decreased. The flanges and webs being forced into the cross-tie by the weight of passing trains effectually secure the plate against any lateral or longitudinal motion and the spikes are relieved of much of their side strain. At the same time the lugs B on the top of the plate, together with the spike-heads, make a secure fastening for

the rail. The marginal flange prevents the accumulation of water beneath the plate, which would rot the ties.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A railroad-tie plate having a pair of lugs, one on each side of the rail position thereof, said lugs being adapted to clasp a rail-flange, the points directly opposite said lugs having spike-holes with reinforcing-lugs for the spikes, substantially as described.

2. A railroad-tie plate having two lugs one on each side of the rail-line thereof, said lugs being adapted to clasp a rail-flange, spike-holes with reinforcing-lugs behind them opposite said lugs, and drain-gutters between said lugs passing from edge to edge of said plate beneath the rail-flange, substantially as described.

3. A railroad-tie plate having upon its upper side a lug on each side of the rail-line thereof, said lugs projecting toward the said rail-line and adapted to confine a rail-flange beneath them, spike-holes with reinforcing-lugs behind them opposite said lugs, and a marginal flange with transverse webs upon its lower side, substantially as described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

HENRY W. AVERY.

Witnesses:
ALBERT H. BATES,
H. M. WISE.

2115 & 2116 EXHIBIT S62.

KATE S. HOLMES,
Notary Public.

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1350

No. 684,466. Patented Oct. 15, 1901.

J. M. SELLERS.

TIE PLATE.

(Application filed Feb. 4, 1901.)

(No Model.)

Fig. 1.

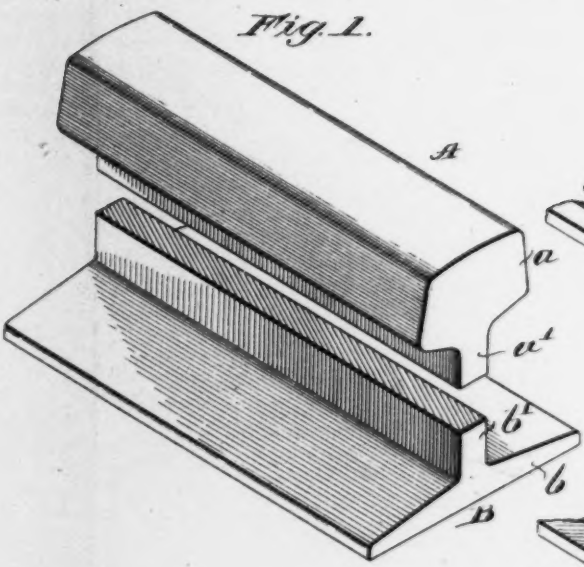


Fig. 2.

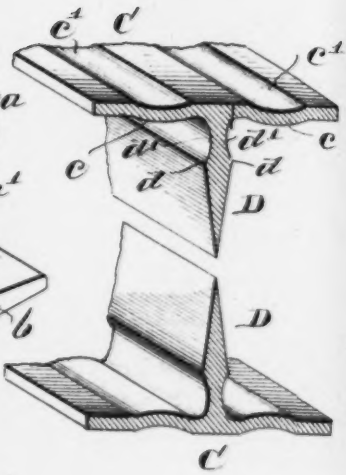
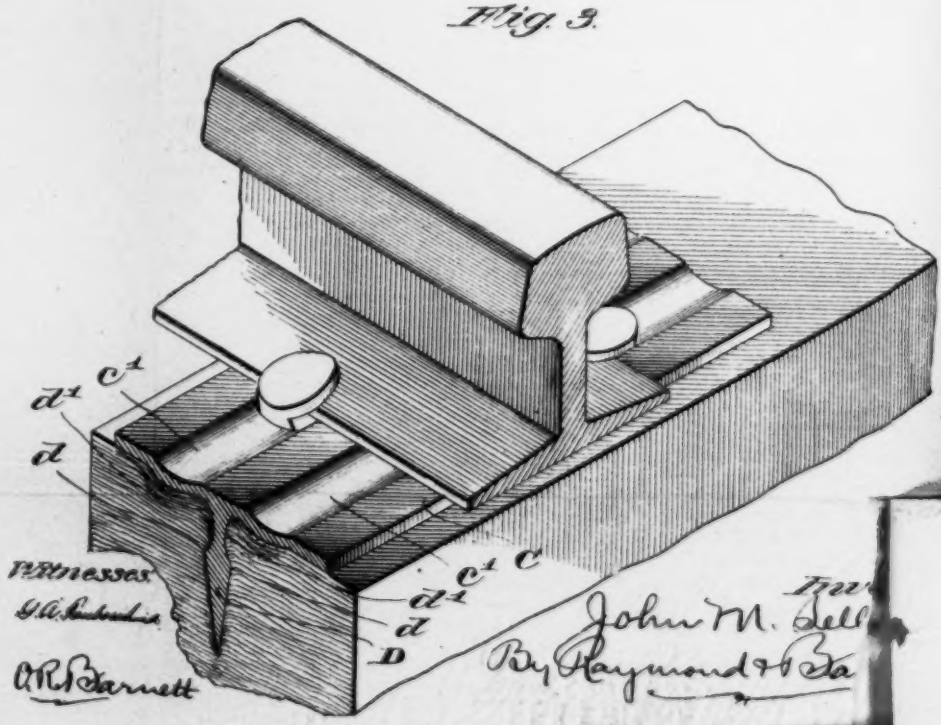


Fig. 3.



Witnesses:

G. A. Burbank

A. R. Starnett

John M. Sellers

By Raymond & Co.

TORN P

1351

UNITED STATES PATENT OFFICE.

JOHN M. SELLERS, OF CHICAGO, ILLINOIS.

TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 684,466, dated October 15, 1901.

Application filed February 4, 1901. Serial No. 46,023. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. SELLERS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Tie-Plates, of which the following is a specification.

My invention relates to improvements in tie-plates which are intended to be secured to the upper surface of railway ties or sleepers, so as to furnish a bearing plate or surface upon which the rails are laid and to which the rails are spiked instead of being spiked or secured directly to the sleepers.

The objects of my invention are to furnish such a tie-plate which shall be simple to produce, shall be most effectively secured to the tie, and in an extremely simple manner.

A further object of my invention is to produce such a tie-plate, which can be readily rolled out of old T-rails.

These and such other objects as may hereinafter appear are attained by the devices illustrated in the accompanying drawings, in which—

Figure 1 shows a section of a T-rail separated longitudinally through the web for the purpose of rolling the same into my improved tie-plate. Fig. 2 shows the sections of the same rail as they appear after having been rolled into my tie-plate. Fig. 3 is a perspective view showing a section of a rail laid upon one of my tie-plates and showing the tie-plate and tie in section, with the tie-plate driven into the tie.

A great advantage of my improved tie-plate is that it is of such form that it may be readily rolled from old and damaged T-rails without any waste and in such a manner that the form in which the T-rail has been rolled in the manufacture of the rail amounts substantially to a first step in the manufacture of my tie-plate.

As shown in Fig. 1, I separate a T-rail longitudinally about midway of the height of its web into the pieces A and B. This gives me two blanks, each of which comprises a wide portion *a b* and a narrow portion *a' b'* projecting therefrom. By means of suitable rolls and repeated passes these blanks are rolled into the tie-plates shown in Fig. 2, the head and a portion of the web of the rail being rolled into a tie-plate and the flange and the other portion of the web being rolled into a like tie-plate. These tie-plates, which are substantially T-shaped in cross-section, consist of a flange C and a depending stem D. This depending stem is preferably a continuous stem depending from the center of the flange along its entire length. The distinctive feature of this stem lies in its spear-shaped cross-section, it having a sharp-pointed or cutting edge at its farther extremity, from which edge it tapers to the shoulders *d*, between which and the point of its junction with the flange it is rounded or hollowed into the recesses *d'*. While the flange of the tie-plate may be rolled perfectly flat, both upon its upper and under surfaces, I prefer to roll it, as shown in the drawings, with a projecting longitudinal rib or shoulder *c* extending parallel with the stem D on each side thereof. This shoulder may be of any suitable contour; but I consider that the best results are obtained when it is formed so as to round away from the stem D, as shown in the drawings. These shoulders or ribs may be most readily formed by rolling sand-troughs *c'* along the upper surface of the flange C, so as to correspondingly bulge the under side of the flange C into the desired shoulders; but this is not essential to my invention, and, if desired, the flange C may be formed perfectly plane on its upper side and with the longitudinal shoulder *c* on its under side.

By forming my tie-plate from sections of T-rails divided as described I am enabled to readily produce a tie-plate with a very long stem D, which is adapted to be driven into the tie, so as to firmly secure the tie-plate to the wooden tie. While this of itself is a great advantage over all such plates known to me in the prior art, distinctive features of my device are the grooves *d'* and the shoulders *c*, which coöperate to hold the tie-plate in place against the "bounding" of the rail under the passage of trains in the following manner:

It will be observed that the tie-plate is laid longitudinally with the tie and the rail is laid transversely of the tie-plate. The depending stem D, extending longitudinally of the tie-plate, will therefore enter the wood of the tie lengthwise of its grain, and by reason

of its wedge shape the tendency of the stem D when driven into the tie will be to separate the fibers of the wood and to crowd them together rather than to cut them. It is evident, therefore, that as soon as the shoulders *d* at the widest part of the stem D are driven below the fibers of the wood at any given point the natural elasticity of these fibers will cause them to enter into the recesses of the grooves *d'* and to resist any tendency of the plate to draw out of the wood, thereby causing the shoulders *d* to force the fibers of the wood out of the grooves or recesses *d'*. This tendency of the wood to crowd into these grooves *d'* and to grip against the under sides of the shoulders *d*, so as to hold the tie-plate securely, is aided by the ribs *c* as soon as the under side of the flange of the tie-plate is driven down upon the upper surface of the tie. When this occurs, the ribs *c* are forced into the wood of the tie and tend to crowd and compress the fibers of the wood into the grooves *d'*. Of course the more the wood is compressed into these grooves the greater the resistance it will offer to the withdrawal of the stem D.

I am aware that it is old in this art to provide tie-plates having sharp-edged ribs for driving into the wood of a tie, and also having various forms of integral spiked points for this purpose, and I do not broadly claim such an article as my invention; but, so far as I am aware, it is broadly new with me to produce a tie-plate with longitudinal grooves *d'* upon the attaching-stem D for the purposes specified, and I also believe it to be broadly new with me to provide such a plate with the ribs *c* on the under side thereof for the purpose of crowding and compressing the wood, so as to more firmly secure the attaching ribs, stem, or points in the wood.

Of course the exact contour of the grooves *d'* of the shoulders *d* and of the ribs *c* may, any or all of them, be varied without departing from the spirit of my invention, and such variations of contour and proportions are contemplated by my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A tie-plate comprising a horizontal flange and a centrally-disposed stem extending longitudinally and from the under face thereof, said stem having a generally spear-shaped cross-section, substantially as described.

2. A tie-plate comprising a bed-plate, a stem extending longitudinally and from the under face thereof, said stem having a cutting edge, longitudinal shoulders on each side thereof and longitudinal grooves between said shoulders and the under surface of said bed-plate, substantially as described.

3. In a tie-plate, the combination with a bed-plate, of an attaching-stem on the under side thereof, said attaching-stem having a wedge-shaped point, longitudinal grooves upon the opposite faces of said stem between the widest part thereof and the under side of said bed-plate, and longitudinal ribs on the under side of said bed-plate adapted to cooperate with said longitudinal grooves, substantially as described.

4. A tie-plate comprising a bed-plate, a stem extending longitudinally along the under face thereof, said stem having a wedge-shaped point and longitudinal grooves extending along opposite faces of said stem between the widest part of said wedge and the base of said stem, substantially as described.

5. A tie-plate comprising a bed-plate, a stem extending longitudinally along the under face thereof, said stem having a wedge-shaped point and longitudinal grooves extending along opposite sides of said stem between the widest part of said point and the base of said stem, and said bed-plate being provided on its under side with longitudinal ribs upon opposite sides of said stem, substantially as described.

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21 & 2122 EXHIBIT S63.

KATE S. HOLMES,
Notary Public.

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No. 691,037. Patented Jan. 14, 1902.

B. WOLHAUPTER.

RAIL JOINT.

(Application filed May 11, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig 1

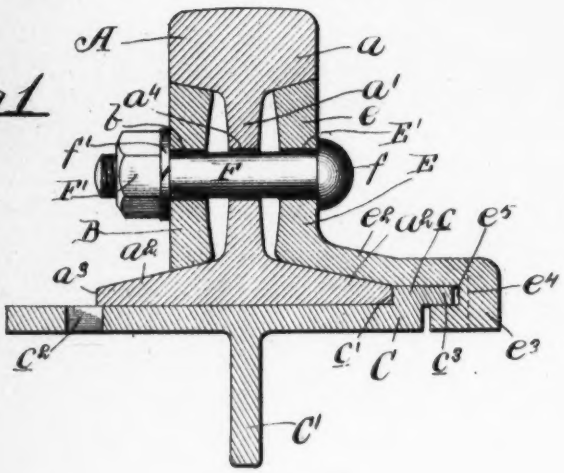
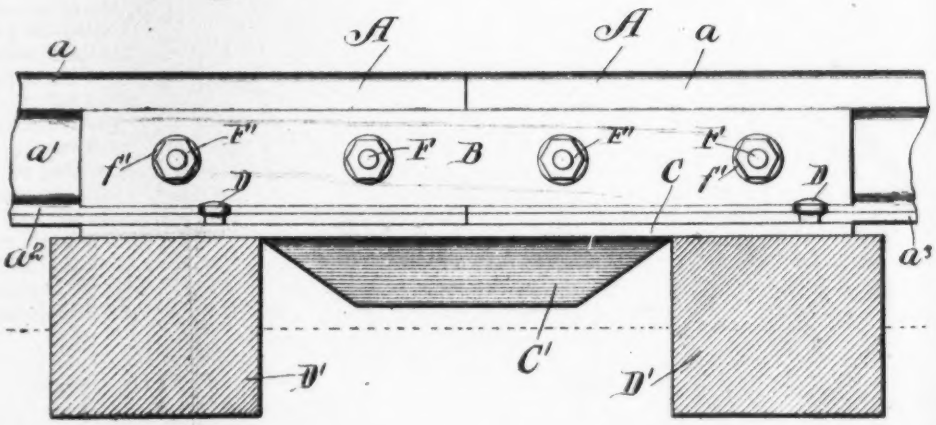


Fig 2



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1355

No. 691,037. Patented Jan. 14, 1902.

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(No Model.) 3 Sheets—Sheet 2.

Fig 3

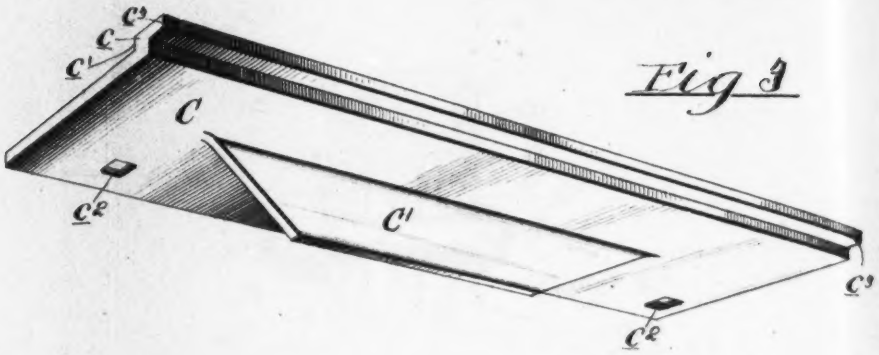


Fig 4

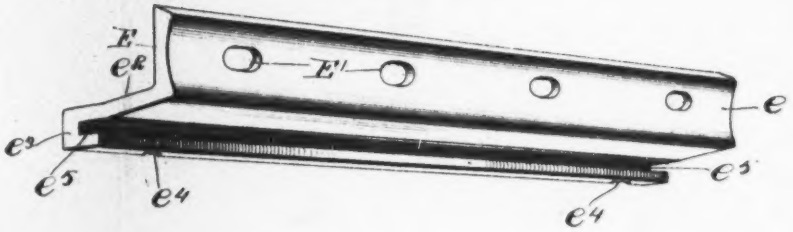


Fig 5

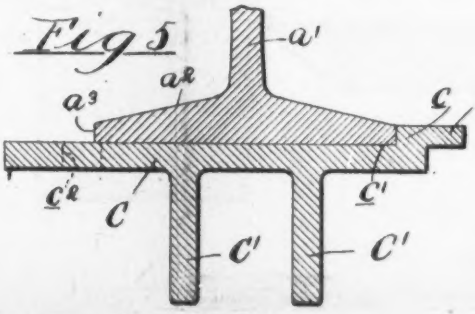
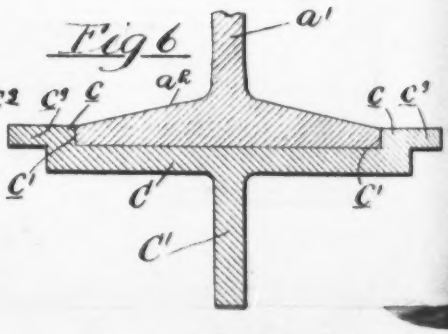


Fig 6



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No. 691,037.

B. WOLHAUPTER.

Patented Jan. 14, 1902.

RAIL JOINT.

(No Model.)

(Application filed May 11, 1899.)

3 Sheets—Sheet 3.

Fig 7

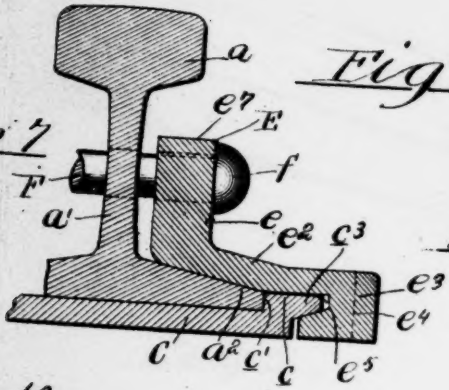


Fig 8

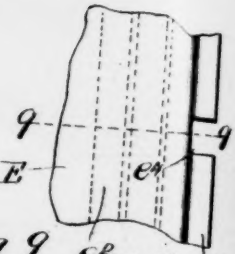


Fig 9

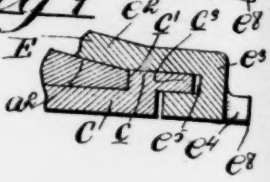


Fig 10

Fig 11

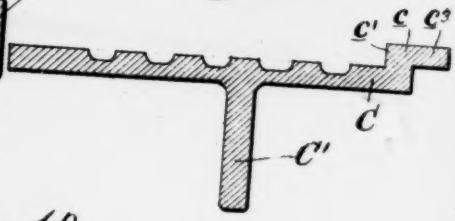
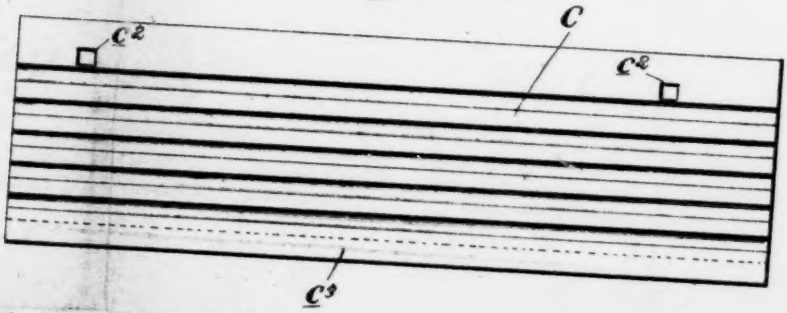


Fig 12



Witnesses:

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M. Hicks

Inventor:

Benjamin Wolhaupter

by Poole & Brown his Attys

UNITED STATES PATENT OFFICE.

BENJAMIN WOLHAUPTER, OF CHICAGO, ILLINOIS.

RAIL-JOINT.

SPECIFICATION forming part of Letters Patent No. 691,037, dated January 14, 1902.

Application filed May 11, 1899. Serial No. 716,351. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN WOLHAUPTER, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Rail-Joints; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to an improved construction in rail-joints of that class having a supporting or base plate on which the ends of the rail rest and which is itself supported upon the ties.

The main features of construction in the joint herein described are adapted for either a suspended joint, or one located between adjacent ties, or one in which the ends of the rail are located over and directly supported by a tie. Some of the features of the invention are, however, adapted especially for use in a suspended joint.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In said drawings, Figure 1 is a transverse vertical sectional view of my improved base-plate and rail-joint. Fig. 2 is a side elevation of the same, showing the ties in section. Fig. 3 is a perspective view of a girder form of base-plate, showing a single stiffening-flange. Fig. 4 is a perspective view of the angle-plate. Figs. 5 and 6 are transverse vertical sectional views of a portion of the rail, showing modified forms of the base-plate. Fig. 7 is a transverse vertical sectional fragmentary view showing a modified form of the angle-plate and the flange of the base-plate engaged therewith. Fig. 8 is a fragmentary plan view of the outer edge of one form of the angle-plate, showing a recess cut therein for insertion of the spike. Fig. 9 is a vertical sectional view taken on line 9 9 of Fig. 8. Fig. 10 is a vertical sectional view showing a modified form of the base-plate. Fig. 11 is a vertical sectional view showing still another modified form of the base-plate. Fig. 12 is a plan view of that form of base-plate shown in Fig. 11.

Describing the first construction illustrated in Figs. 1, 2, 3, and 4, A A indicate the adjacent ends of an ordinary track-rail, comprising a head a, a web a', and foot-flanges a^2. Preferably the upper surfaces of the foot-flanges a^2 and the under surfaces of the head a will be provided with angular faces inclined at like angles to the perpendicular. The web a' will be provided with one or more transversely-arranged bolt-apertures a^4 in the usual manner.

B is a fish-plate, which may be of any ordinary construction. As shown herein, it is formed with its upper and lower margins inclined at similar angles, so as to engage the angular faces on the under side of the head a and the upper side of the foot-flanges a^2 of the rail. It is provided with one or more transversely-arranged bolt-apertures b to register with the apertures a^4 of the rail-web.

C is a base-plate, in this instance shown as flat on its upper and lower surfaces and somewhat wider than the combined width of the rail-flanges. On one side it is provided with an upturned portion or member c, forming a shoulder c', against which the edge or margin a^3 of one flange of each rail may rest when the rail is in position upon the top of the base-plate, as shown in Fig. 1. At the opposite side of the base-plate C the same is provided with one or more spike-holes c^2, through which ordinary railway-spikes may be driven into the tie D' in a familiar manner. Ordinarily two spikes-holes will be used; but one only may be used when a tie is located beneath the meeting ends of the rails. The position of the slot or aperture c^2 will be such that when the rail is placed in position upon the base-plate C with the edge a^3 of one of the rail-flanges abutting against the shoulder c' the edge a^3 of the other rail-flange will be at such distance from the outer margin of the spike-hole as to admit the thickness of the spike, the latter thereby forming a key by which the rail is held against the said shoulder c'. The base-plate C is provided with horizontal bearing-surfaces at its end portions for contact with the ties and is also provided with a longitudinal depending flange made integral therewith, as shown in Figs. 2 and 3, and extending between said end portions thereof. Said flange is made of such length where it joins the base-plate as to extend between the sides of adjacent ties and is preferably made with inclined

ends. Said integral flange gives to the base-plate the form of a girder, serving to stiffen the part of the same between the ties to resist downward deflection under the downward strains coming on the ends of the rails.

E is an angle-plate having a vertical and a lateral member. The vertical member e is constructed to fit between the rail-head and foot-flange, and its upper and lower edges are provided with angular surfaces corresponding with the inclined surfaces of the upper surface of the rail-flange a^2 and the under surface of the head a. This vertical member is also provided with one or more horizontally-arranged bolt-apertures E', registering with the apertures a^4 of the rail-web. The lower member e^2 of the angle-plate extends outwardly over the rail-flange, and its outer margin is adapted to have interlocking engagement with the adjacent margin of the base-plate. Such interlocking connection, as shown in the drawings, is formed by means of an outwardly-extending flange c^3 on the base-plate and a marginal extension e^3 on the angle-plate, which extends around the said flange c^3 and engages the under surface of the same. The outer margin of this extension e^3 will be provided with one or more vertically-arranged recesses or slots e^4. (Shown in Fig. 4 and indicated by the dotted line in Fig. 1.) These slots or recesses are adapted for the reception of spikes D, whereby the angle-plate E may be secured to the ties D'. The outwardly-extending part of the angle-plate, together with the flange e^3 therein, which extends beneath and engages the flange c^3 of the base-plate, forms, in effect, a groove e^5, which receives said flange c^3. Said flange of the base-plate need not, however, fit closely against the top surface of said groove, the parts being interlocked by the contact of the angle-plate against the top of the said flange and the contact of the flange c^3 with the flange e^3, which extends beneath the same. The distance from the shoulder c' to the bottom of the groove e^5 is somewhat greater than the distance from said shoulder to the outer edge of the flange c^3, so as to admit of lateral movement of the angle-plate with respect to the base-plate when the bolts which secure the angle-plate to the rails are tightened. The contact-surfaces of said flanges c^3 and e^3 are, moreover, horizontal, and one or both of said surfaces are extended laterally to permit lateral adjustment or shifting of the angle-plate without affecting the clamping action of the angle-plate on the rail-flange.

F is a tie-bolt provided with the usual head f on one end and with screw threads upon the other. It extends through registering apertures a^1, b, and E' of the rail-web, fish-plate, and angle-plate, and by means of the nut F' the parts are secured together and the angle-plate may be adjusted or tightened with respect to the rail in a familiar manner. If desired, any familiar form of nut-lock f' may be inserted between the nut F' and the fish-plate B. The bolts arranged as described constitute a means for adjustably securing the angle-plate to the rails, and any other form of adjustable securing means may be employed in place thereof.

Referring now to the various modifications of my invention, I first point out that I may in some instances use a plurality of depending flanges C' C', as indicated in Fig. 5. On the other hand, as indicated in Fig. 10, the special form of base-plate therein shown may be without any flange, although in some instances the said flange C' might be used with that particular form of base-plate. Ordinarily the flat form of base-plate shown in Fig. 3 will be used; but the form shown in Figs. 10 and 11 embodies further improvements in the construction of such base-plate. In Fig. 10 I have shown what might be termed a "corrugated" base-plate, the same having a plurality of longitudinal corrugations formed by parallel ribs and intervening grooves or recesses on both the upper and lower surfaces of the base-plate. It will be observed, however, that substantially flat bearing-surfaces are presented in this form of base-plate both on the top and bottom of the same. In Fig. 11 the stiffening-ribs are shown only in the upper surface of the base-plate. These ribs extend lengthwise of the base-plate the entire length thereof, as shown in Fig. 12. The ribbed or corrugated form of base-plate shown may be readily made of wrought metal by the process of rolling. Moreover, the flange or flanges C' shown in other figures of the drawings may be easily formed by first rolling the blanks with the flange or flanges extending the full length thereof and then cutting away the end portions of the flanges, so as to leave the plates with flat bearing-surfaces at their ends for contact with the ties.

In Fig. 7 I have shown a modification of the locking device between the base-plate and the angle-plate. In the construction first described the flange c^3 and the flange e^4 were shown as having horizontal contact-surfaces. The modification consists in having surfaces inclined, so as to make the flange c^3 of wedge shape. It will be manifest that when the angle-plate and the base-plate thus made are interlocked, the tie-bolt inserted, and the nuts therein tightened the inclined surface of the flange c^3 will draw the outer margin of the angle-plate downwardly, and thereby clamp the same more firmly against the rail-flange. With this construction it may be unnecessary to extend the vertical member e of the fish-plate to the head a of the rail, and in F[illegible] I have shown this vertical member as [illegible]nating at the point lettered e^7. In this [illegible] of angle-plate, however, it will be prefe[illegible] to materially thicken the vertical mem[illegible] in the manner indicated in Fig. 7.

It may be desirable in some instances [illegible] the downwardly-extending member e^3 [illegible] angle-plate should not be so thick at its [illegible] as shown in Figs. 7 and 1, and said me[illegible]

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c^3 may be provided on its outer margin with a laterally-extending flange e^8, provided with notches e^4 to receive the holding-spikes, as will be clearly understood by reference to Figs. 8 and 9.

In some instances it may be desirable to omit the spike-holes c^2 in one side of the base-plate and to provide each side of the base-plate with the shoulder c' and outwardly-extending flange c^3 for engagement with angle-plates such as are shown in Fig. 1. This modification is indicated in Fig. 6. Of course it will be understood that when this form of base-plate is used the fish-plate B will be dispensed with and the angle-plate used on both sides of the rail.

A main feature of my invention is embraced in a construction comprising a base-plate and an angle-plate having interlocking engagement with one side of the base-plate and wherein the base-plate is provided at its opposite side with spike-holes, through which may be inserted spikes for securing both the rail and base-plate to the ties. So far as this general feature of my invention is concerned the plate need have no shoulder against which the edge of the rail-flanges rest, or if such shoulder be present it may be so located that the rail-flanges do not come in contact with the same when the parts are finally secured in place, it being obvious that if the rail-flanges do not rest in contact with such a shoulder the rail will be held from movement in one direction by the spikes and from movement in the opposite direction by contact of the angle-plate, which is spiked to the ties, with the inclined surfaces of the rail head and flange. It is to be noted, however, that inasmuch as the tightening of the bolts F or other securing means will move the angle-plate with respect to the rail, if no shoulder be present on the base-plate or if the rail-flanges do not bear against a shoulder on the base-plate, the base-plate, as well as the angle-plate, will in such case be moved or shifted in tightening the angle-plate against the rail, and it will become necessary to remove the spikes from the base-plate and reinsert them after the base-plate has been brought to the desired position, the old spike-holes in such case being usually plugged with wood in order that the spikes may be driven accurately in the proper place. By reason of the disadvantage arising from such shifting the base-plate I prefer to employ a base-plate provided with a shoulder, as herein described, and to arrange the rails with the flanges thereof bearing against the shoulder, thereby maintaining a constant position or relation of the base-plate to the rail and enabling the base-plate to remain undisturbed or permanently secured to the ties. When this latter construction is employed, obviously the angle-plate must have lateral adjustment with respect to the base-plate, and in the process of tightening the angle-plate against the rail said angle-plate will be moved with respect to the base-plate, while the latter will remain undisturbed, and the removal and insertion of the spikes becomes unnecessary. The construction in which the base-plate is provided with a shoulder against which the rail-flanges rest and where the angle-plate is laterally adjusted with respect to the base-plate constitutes, therefore, an important part of my invention and is herein claimed as such.

The base-plate C will invariably be so placed that the shoulder c' is at the outer side of the rails and the spike-holes c^2 at the inner margins thereof, so that the lateral outward strain on the rails, due to the outward pressure of the wheel-flanges thereon, will be resisted by the contact of the rail-flanges with said shoulder and by the engagement of the spikes with the spike-holes c^2. In this respect the spike-holes perform a function which would not be performed by open notches in the inner side of the base-plate, it being obvious that the spikes inserted through said holes at the inner sides of the rails are by this construction equally as effective as those at the outer margin of the base-plate to hold the rails from shifting laterally and that if the outer spikes were entirely omitted the inner spikes would be entirely effective for holding the rails in place. For these reasons the employment of the base-plate with a shoulder at its outer margin and spike-holes, as distinguished from spike-notches at its inner margin constitutes an important and valuable feature of my invention, giving great advantages in the use of the base-plate thus constructed.

I claim as my invention—

1. The combination with track-rails, of a base-plate provided near its margin on its upper surface with an inwardly-facing shoulder against which the edge of the rail-flange rests, and outside of said shoulder with a laterally-directed flange, of an angle-plate applied to the side of the rail and provided with a flange which has interlocking engagement with the flange of the base-plate.

2. The combination with track-rails, of a base-plate provided near its margin on its upper surface with an inwardly-facing shoulder against which the edge of the rail-flange rests, and an angle-plate applied to the side of the rail and provided with a flange which has interlocking engagement with the flange of the base-plate, said flanges on the base-plate and the angle-plate having engaging surfaces which are constructed to afford lateral adjustment of the angle-plate with respect to the base-plate.

3. The combination with track-rails, of a base-plate provided near its margin with an inwardly-facing shoulder against which the base-flange of the rail rests, and outside of said shoulder with a laterally-directed flange which is located above the lower surface of the base-plate, and an angle-plate applied to the side of the rail and provided with a flange

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which fits over the flange of the base-plate with its margin engaging the under surface of the said flange of the base-plate.

4. The combination with track-rails, of a base-plate provided near its margin with an inwardly-facing shoulder against which the base-flange of the rail rests, and outside of said shoulder with a laterally-directed flange which is raised above the lower surface of the base-plate, and an angle-plate applied to the side of the rail and provided with a flange which fits over the flange of the base-plate with its margin engaging the under surface of the said flange of the base-plate, and with its lower surface not lower than said lower surface of the base-plate.

5. The combination with track-rails, of a base-plate provided near its margin and on its upper surface with an inwardly-facing shoulder and, outside of said shoulder, with a laterally-directed flange the upper surface of which is not higher than the upper surface of the rail-flange, and an angle-plate applied to the side of the rail and provided with a flange which has interlocking engagement with the flange of the base-plate.

6. The combination with track-rails, of a base-plate provided near one margin thereof with an inwardly-facing shoulder against which one edge of the flange of the rail rests, and outside of said shoulder with a laterally-directed flange, and provided also adjacent to its opposite margin with a spike-hole, said spike-hole being located with its inner side inside of the vertical plane of the adjacent edge of the rail-flange, and an angle-plate applied to the side of the rail and provided with a flange which has interlocking engagement with the flange of the base-plate.

7. The combination with track-rails, of a base-plate provided near its margin on its upper surface with an inwardly-facing shoulder and outside of said shoulder with a laterally-directed flange, and an angle-plate applied to the side of the rail and provided with a flange which has interlocking engagement with the flange of the base-plate, a fish-plate applied to the side of the rail opposite the angle-plate and a bolt passing through said fish-plate, angle-plate and the rail.

8. The combination with track-rails, of a base-plate provided near its margin on its upper surface with an inwardly-facing shoulder and outside of said shoulder with a laterally-directed flange, an angle-plate applied to the side of the rail and provided with a flange which has interlocking engagement with the flange of the base-plate, a fish-plate applied to the side of the rail opposite to the angle-plate and a bolt passing through the fish-plate, angle-plate and the rail, said base-plate being provided on its margin opposite to the flange thereof with a spike-hole, the inner side of which is located inside of the vertical plane of the edge of the adjacent rail-flange.

9. The combination with track-rails, of a base-plate provided at one side with a shoulder against which one flange of each rail rests and with an outwardly-extending flange, exterior to said shoulder and above the level of the bottom of the surface of the base-plate, and at its opposite side with spike-holes, adjacent to the edge of the rail-flanges, an angle-plate the lower part of which extends outwardly over the rail-flange and extends around and engages the under surface of the said outwardly-extending flange on the base-plate, said lower part of the angle-plate being provided on its outer margin with one or more notches for spikes, and means for securing said angle-bar to the rails.

10. The combination with track-rails, a base-plate provided at one side with a shoulder against which one flange of each rail rests and with an outwardly-extending flange exterior to said shoulder and above the level of the bottom surface of the base-plate and at its opposite side with a spike hole or holes adjacent to the edges of the rail-flanges, an angle-plate which extends outwardly over the rail-flange and the outer margin of the base-plate and is provided with a spike notch or notches the outer margin and means for adjustably securing the angle-plate to the rails, said flange of the base-plate and angle-plate being provided with contact-surfaces one of which is extended laterally and horizontally to afford lateral adjustment to the angle-plate with respect to the base-plate.

11. The combination with track-rails, the surfaces on the top of the rail-flanges and the under side of the rail-head being oppositely inclined at like angles, an angle-plate provided with upper and lower angular surfaces corresponding with those on the rail flanges and heads, means for adjustably securing the said angle-plate to the rail, of a base-plate provided adjacent to its margin on its upper surface with an inwardly-facing shoulder and outside of said shoulder with a laterally-directed flange, and a flange on said angle-plate which has interlocking engagement with the flange of the base-plate to afford lateral adjustment of the angle and base plates.

12. The combination with track-rails, a base-plate provided at one side with a continuous shoulder against which one flange of each rail rests and an outwardly-projecting flange, exterior to said shoulder and above the level of the bottom of the plate, and at its opposite side with a spike hole or holes adjacent to the edges of the rail-flanges, an angle-plate which is extended at its outer margin around the said flange and engages the lower surface thereof, and means for adjustably securing the angle-plate to the track-rails, said flange of the base-plate and angle-plate having contact-surfaces, one of which is extended horizontally and laterally to afford lateral adjustment of the angle-plate with respect to the base-plate.

13. The combination with track-rails, each

having angular surfaces on the top of the rail-flange and under side of the rail-head which are oppositely inclined at like angles, of a base-plate provided at one side with a shoulder against which one flange of each rail rests, and at its opposite side with spike-holes adjacent to the edges of the rail-flanges, an angle-plate provided with upper and lower inclined surfaces corresponding with those on the rail flanges and heads, and means for adjustably securing the angle-plate to the rails, said base-plate and angle-plate being provided with interlocking parts having contact-surfaces one of which is extended laterally and horizontally to afford lateral adjustment of the angle-plate with respect to the base-plate.

14. The combination with track-rails, each having angular surfaces on the top of the rail-flange and under side of the rail-head, which are oppositely inclined at like angles, of a base-plate provided at one side with a shoulder against which one flange of each rail rests and with an outwardly-projecting flange, and at its opposite side with spike-holes adjacent to the margins of the rail-flanges, an angle-plate having upper and lower inclined surfaces corresponding with those on the rail flanges and heads, which is extended at its outer edge around the said flange on the base-plate and engages the lower surface of said flange, and means for adjustably securing said angle-plate to the rails, said flange of the base-plate and the angle-plate having contact-surfaces one of which is extended laterally and horizontally to afford lateral adjustment of the angle-plate with respect to the base-plate.

15. A base-plate for rail-joints provided on its upper surface with an inwardly-facing shoulder and laterally outside of said shoulder with a laterally-directed flange which is located above the level of the lower surface of the plate.

16. A base-plate for rail-joints provided on its upper surface with an inwardly-facing shoulder and laterally outside of said shoulder with a laterally-directed flange which is located above the level of the lower surface of the plate, and provided also near its margin opposite said flange with a spike-hole.

17. The combination with the track-rails, of a base-plate provided with a plurality of parallel longitudinal ribs and grooves extending from end to end thereof and also provided with a continuous longitudinal shoulder at one side of its top surface against which the rail-flanges rest, and a laterally-projecting longitudinal flange exterior to said shoulder located above the level of the bottom surface of said base-plate, an angle-plate adapted to engage the top of the rail-flange, and constructed to extend around and engage the lower surface of the said flange of the base-plate and means for securing said angle-plate to the rails.

18. The combination with track-rails, of a longitudinally-ribbed girder base-plate provided with an integral depending flange and having a longitudinal shoulder at one side of its top surface against which one flange of each rail rests, and a laterally-projecting flange exterior to said shoulder located above the level of the bottom surface of said base-plate, an angle-plate engaging the top surface of the rail-flanges and extending over and engaging the lower surface of the said flange of the base-plate and means for securing the said angle-plate to the rails.

19. A base-plate for rail-joints provided throughout its width with longitudinal parallel grooves and ribs on its top and bottom surfaces, giving corrugated form to the plate, the said ribs having flat faces arranged in parallel planes and affording practically flat top and bottom faces on the plate for contact with the rail which rests on the same and with the ties on which the plate is supported.

20. A base-plate for rail-joints provided with longitudinal parallel grooves and ribs on its top and bottom surfaces extending from end to end thereof giving corrugated form to the plate, and having at one side of its top surface a longitudinal shoulder for contact with the edges of the rail-flanges and at its opposite side with a spike hole or holes.

21. The combination with track-rails of a base-plate provided with longitudinal parallel grooves and ribs on its top and bottom surfaces, giving a corrugated form to the plate, and an angle-plate applied to the side of the rail and having interlocking engagement with the base-plate.

22. The combination with track-rails, of a base-plate provided with longitudinal, parallel grooves and ribs on its top surface and at one margin with spike-holes, and an angle-plate applied to the side of the rail and having interlocking engagement with the other side of the base-plate.

23. The combination with track-rails, of a base-plate provided with longitudinal parallel grooves and ribs on its top surface and at one side of said top surface with a shoulder for contact with the edges of the rail-flanges, and an angle-plate fitting between the heads and flanges of the rail and extending outwardly over the side margins of the base-plate.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 6th day of May, A. D. 1899.

BENJAMIN WOLHAUPTER.

Witnesses:
C. CLARENCE POOLE,
CHARLES W. HILLS.

POOR COPY

No. 691,317.

Patented Jan. 14, 1902.

W. S. JONES.

RAILWAY TIE PLATE.

(Application filed July 12, 1899.)

(No Model.)

Fig 1.

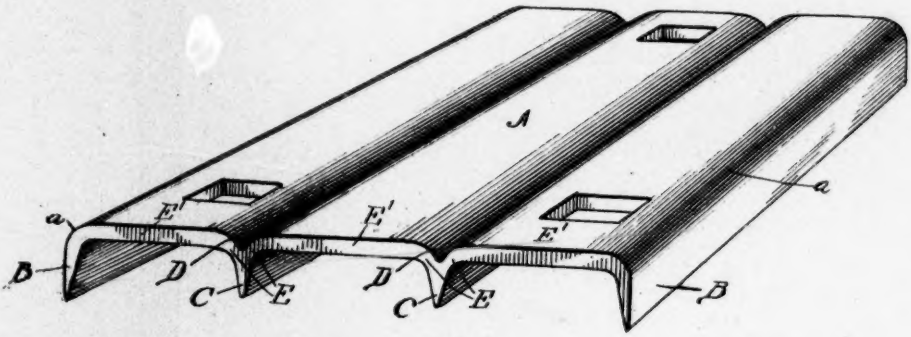
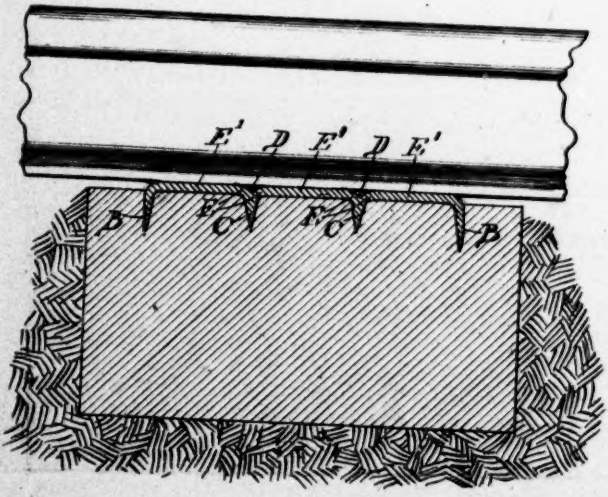


Fig 2.



Witnesses
J. H. Iker.
Edward Bennett.

Inventor
Willis S. Jones
By Peter N. Lamboley Atty

UNITED STATES PATENT OFFICE.

WILLIS S. JONES, OF CHICAGO, ILLINOIS, ASSIGNOR TO DAVID S. WEGG, OF CHICAGO, ILLINOIS.

RAILWAY-TIE PLATE.

SPECIFICATION forming part of Letters Patent No. 691,317, dated January 14, 1902.

Application filed July 12, 1899. Serial No. 723,540. (No model.)

To all whom it may concern:

Be it known that I, WILLIS S. JONES, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented a certain new and useful Improvement in Railway-Tie Plates; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its object the production of a railway-tie plate which shall combine several novel and useful features.

The invention belongs to that class of plates wherein the under side of the plate is provided with tie-engaging flanges which enter and extend parallel with the grain of the tie when the plate is in position thereon. It has been found by experiment that the plate of the greatest efficiency is one wherein each side edge of the plate is provided at the edge with a depending flange adapted to enter the tie and wherein one or more corresponding flanges depend from the body of the plate within the outer edges. My particular aim in this invention is therefore to provide such a plate and to combine with it certain other advantageous features—as, for instance, the provision on the top of the plate of sand-grooves, whereby any accumulation of sand between the rail and plate will work into the groove, and thus prevent the grinding away of the bearing-surface of the plate and the rail. Now I have found that by locating these sand-grooves directly above the under side depending flanges I can materially reduce the weight of the plate without affect- ...ength.

... invention therefore consists, generally ...aking, in the provision of a plate having ...pending tie-engaging flanges at its edges ...d one or more intermediate depending ...nges with grooves in the top of the plates ... the flanges. My plate also embodies ... novel features to be hereinafter de-

...rawings, Figure 1 is a perspective ...y plate. Fig. 2 is a cross-section illustrating the relation of the rail-tie and tie-plate.

In carrying out my invention, A represents the plate proper, B the depending flanges at the edges of the plate, and C the intermediate depending flanges.

D represents sand-grooves in the upper surface of the plate, preferably located directly above the intermediate tie-engaging flanges C.

I will now call particular attention to the rounded corners *a* at each longitudinal edge of the plate. The purpose of these rounded edges is to throw the strain or weight of the rail onto the plate at a point inside the edge or at a point inside the edge tie-engaging flanges. Another purpose is to prevent the wear on the edge of the plate due to what might be termed a "rocking" of the rail—that is to say, a vertical motion of the rail caused by the weight of the passing wheel on the rail between the ties, thereby depressing the rail slightly at this point, while that portion of the rail above the tie is very slightly raised. This tilting of the rail is of course very slight and is not perceptible, except in its effect upon the tie-plates after continued usage, but practical usage of the plate has demonstrated that there is such a tilting of the rails, and a practical use of my improved plate shows that the rounded edges overcome the wear due to this slight tilting. At this point also it might be well to call attention to the particular advantage of having a tie-engaging flange at the edge. This same tilting motion of the rail which I have just described acts to loosen the plate to a great or less extent when the tie-engaging flanges are not at the edge, but with the flanges at this point and with the rounded edge the plate is held firmly in place and will not rock upon the tie.

Another feature of my invention is the slight flaring out of the tie-engaging flanges B. The advantage of this is that as the flanges enter the tie they enter it in a slight diagonal direction, thus locking the plate more firmly in place.

Another material advantage is the thinning of the metal, as at E. Thus while maintaining the thickness of the plate, as at E',

the weight is reduced for a given size and thickness of the plate by thinning the metal at the same vertical portions where the metal is more or less on edge, and a thinner body of metal can stand the pressure brought on it.

What I claim is—

1. A railway-tie plate consisting of a plate having curved edges terminating in downwardly-extending tapered, tie-engaging flanges, parallel grooves in the upper face of the plate and tapered flanges in line with and below the grooves, their upper edges reinforcing or strengthening the metal walls of the grooves, substantially as described.

2. A railway-tie plate having curved edges terminating in downwardly-extending tapered tie-engaging flanges and provided on its upper side with one or more sand-grooves and on its under side with one or more tie-engaging flanges directly beneath the grooves, the metal comprising the walls of said grooves being thinner than the body of the plate, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

WILLIS S. JONES.

Witnesses:
WALTER H. CHAMBERLIN,
GERTRUDE HEIDELBERGER.

1 & 2142

EXHIBIT S65.

KATE S. HOLMES,
Notary Public.

No. 696,964.

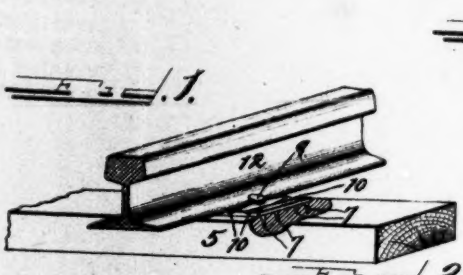
Patented Apr. 8, 1902.

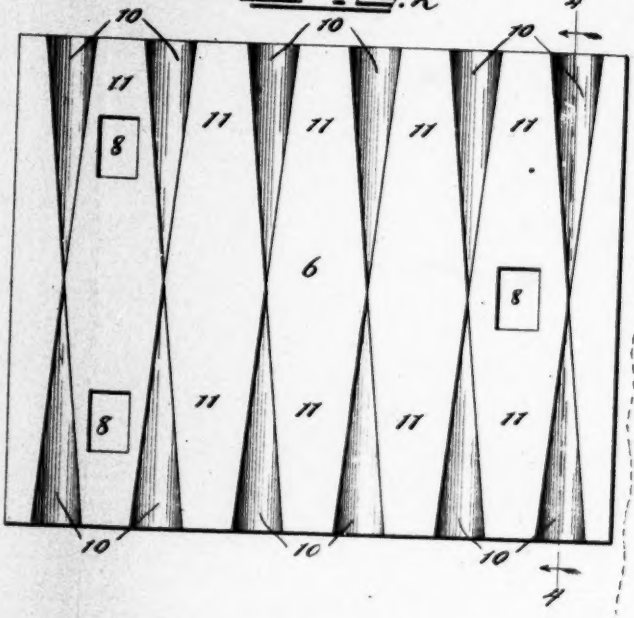
H. H. HART.

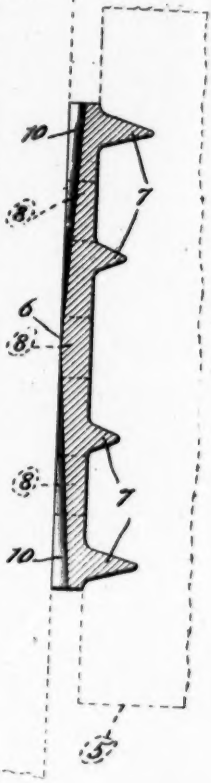
TIE PLATE.

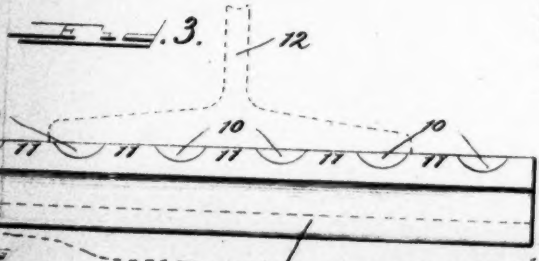
(Application filed Nov. 1, 1901.)

(No Model.)









Witnesses
Jno. L. Berry
H. B. Weir

Inventor
Herbert H. Hart
by Bond, Adams, Pickard & Skelton
his Attys

UNITED STATES PATENT OFFICE.

HERBERT H. HART, OF CHICAGO, ILLINOIS.

TIE-PLATE.

SPECIFICATION forming part of Letters Patent No. 696,964, dated April 8, 1902.

Application filed November 1, 1901. Serial No. 80,759. (No model.)

To all whom it may concern:

Be it known that I, HERBERT H. HART, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Tie-Plates, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to improvements in tie-plates.

Heretofore it has been the practice to construct tie-plates having on their lower surfaces two or more downward-projecting sharpened flanges, which when the tie-plate is in position run parallel with the fibers or grain of the tie and which, being forced into the tie, tend to hold the tie-plate in position. It has also been the practice to provide the tie-plate, in addition to these downward-projecting flanges on its lower surface, with a series of depressions or grooves upon its upper surface, so that the tie-plate consists of two or more thickened rail-supporting portions connected by thinner webs. One of the chief objects of these depressions was to get rid of the sand and dirt which might otherwise accumulate below the rail and by the grinding action of the rail upon the plate cause it to wear away more rapidly, thus shortening the life of the tie-plate.

It is the object of my invention to improve tie-plates of this class; and my invention consists in providing the tie-plate, in addition to the flanges on its lower surface, with a plurality of grooves or depressions upon its upper surface of the peculiar shape hereinafter described for the purpose of firmly supporting the rail on the tie-plate and giving to the grooves a shape hereinafter described, which will more readily and surely cause the sand and dirt which would otherwise accumulate below the rail to be carried away.

In the accompanying drawings, Figure 1 is a view of the tie-plate in position upon the tie with a portion of the rail in position on the tie-plate. Fig. 2 is a top or plan view of the tie-plate. Fig. 3 is a side view of the tie-plate looking parallel with the direction of the rail and across the tie, and Fig. 4 is a section on line 4 4 of Fig. 2.

Referring to the drawings, 5 indicates the tie, upon which is placed the tie-plate 6. The tie-plate 6 is provided on its lower surface with a plurality of downward-projecting flanges 7, which run across the tie-plate from end to end parallel with the fibers of the tie when the tie is in position and are sharpened at their lower edges to cause their ready entering into the tie. 8 indicates spike-holes in the tie-plate for the passage of spikes 9 in the usual manner. The tie-plate on its upper surface is formed with a series of depressions or grooves 10, which preferably meet one another at or near the median line. The grooves or depressions 10 come to a point at their inner ends, where they meet one another, and, as is best shown in Fig. 2, gradually widen as they approach the edge of the tie-plate, being widest at the edge. When the grooves 10 are formed with a curved section, as is best shown in Fig. 3, which is the form which I prefer to use, they will also deepen from their meeting-point toward the outer edges of the tie-plate. I do not, however, confine myself to making the grooves of the peculiar section shown in Fig. 3, as they might of course be formed having some other section, and I do not confine my invention to having these grooves gradually deepen as they approach the edges of the tie-plate, although this is one of the features of my invention. The tie-plate thus formed, it will be seen, consists of a plurality of thickened portions 11, which will be of sufficient strength to support the rail and prevent the buckling of the tie-plate connected by the grooves or depressions 10. Owing to the peculiar shape of the grooves, which widen, as I have said, from their meeting-point at the median line of the tie-plate, the sand and dirt which might otherwise accumulate beneath the rail will be jarred by the action of passing trains into the grooves and will readily pass outward from under the rail 12.

I have shown in the drawings the grooves 10 as running across the tie-plate parallel with the direction of the rail, and this is the position in which I prefer to construct them. I do not confine myself, however, to placing the grooves 10 in the position shown, as it is obvious that their position might be variously changed upon the tie-plate without departing from the spirit of my invention.

That which I claim as my invention, and desire to secure by Letters Patent, is—

1369

1. A tie-plate provided upon its upper surface with a plurality of grooves or depressions contracted at their inner ends and gradually widening toward the edge of the tie-plate, substantially as described.

2. A tie-plate provided upon its upper surface with a plurality of grooves or depressions, said grooves or depressions being contracted at their inner ends and gradually widening and deepening as they approach the edges of the tie-plate, substantially as described.

3. A tie-plate provided upon its under surface with a plurality of sharpened flanges adapted to enter the tie, and upon its upper surface with a plurality of grooves or depressions extending outward from the central portion of said tie-plate, said grooves being contracted at their inner ends and gradually widening as they approach the edges of the tie-plate, substantially as described.

4. A tie-plate provided upon its under surface with a plurality of sharpened flanges adapted to enter the tie, and upon its upper surface with a plurality of grooves or depressions extending outward from the central portion of said tie-plate, said grooves being contracted at their inner ends and gradually widening and deepening as they approach the edges of the tie-plate, substantially as described.

5. A tie-plate provided on its upper surface with two series of grooves or depressions, each series of grooves extending outward from the median line of said tie-plate, said grooves being contracted at their inner ends and gradually widening as they approach the edges of the tie-plate, substantially as described.

6. A tie-plate provided on its upper surface with two series of grooves or depressions, each series of grooves extending outward from the median line of said tie-plate, said grooves being contracted at their inner ends and gradually widening and deepening as they approach the edges of the tie-plate, substantially as described.

HERBERT H. HART.

Witnesses:
JULIA M. BRISTOL,
HELEN M. COLLIN.

47 & 2148

EXHIBIT S66.

KATE S. HOLMES,
Notary Public.

No. 700,714.

F. C. ANDERSON.

Patented May 20, 1902.

RAILWAY RAIL JOINT.

(No Model.)

(Application filed Mar. 13, 1901.)

Fig. 1.

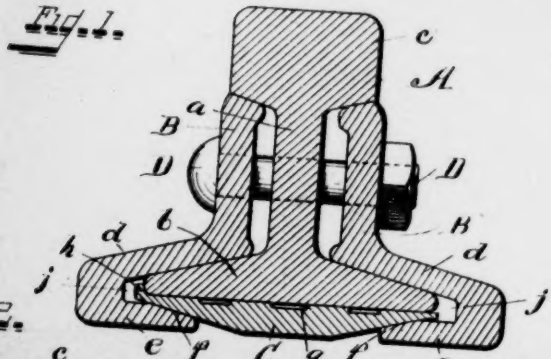


Fig. 2.

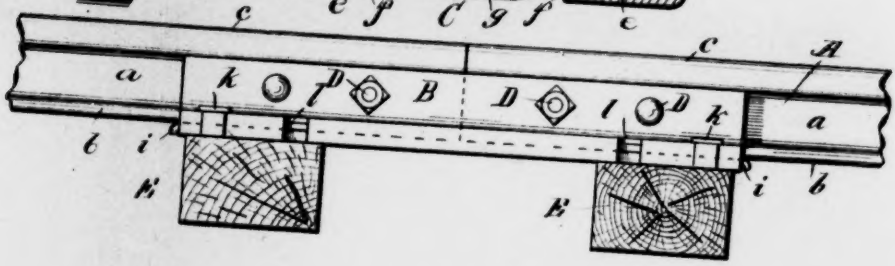


Fig. 3.

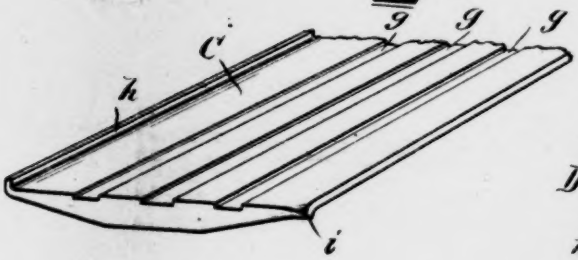
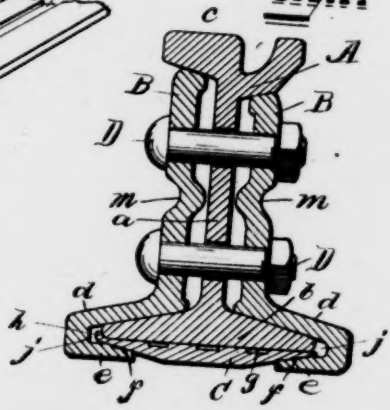


Fig. 4.



Witnesses.

Wm. J. Peck.

Geo. G. Hopkins.

Inventor.

Frank C. Anderson

by Chas. M. Cook

his Attorney.

TORN PAGE

UNITED STATES PATENT OFFICE.

FRANK C. ANDERSON, OF CINCINNATI, OHIO, ASSIGNOR OF TWO-THIRDS TO GEORGE W. ZAPF AND GOODLOW P. GILTZ, OF CINCINNATI, OHIO.

RAILWAY-RAIL JOINT.

SPECIFICATION forming part of Letters Patent No. 700,714, dated May 20, 1902.

Application filed March 13, 1901. Serial No. 50,990. (No model.)

To all whom it may concern:

Be it known that I, FRANK C. ANDERSON, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Railway-Rail Joints, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to improvements in joints for the meeting ends of railway-rails whereby the rail is held absolutely tight and is prevented from working loose at the joint and is rendered practically continuous and stronger at the joints than it is at any other point in the track, the whole forming a simple, cheap, and efficient joint tending greatly to increase the safety of travel and permit high speeds.

The novelty of my invention will be hereinafter more fully set forth, and specifically pointed out in the claims.

In the accompanying drawings, Figure 1 is a sectional end view through a rail and through my improved joint which is applied thereto. Fig. 2 is a diminished side elevation of two rails at their abutting ends with my improved joint applied thereto. Fig. 3 is a broken perspective view, enlarged, of the base wedge-plate. Fig. 4 is a sectional end view through a grooved top rail with a wide web, such as are commonly used for street-railways, showing the application of my invention applied thereto at the joint.

The same letters of reference are used to indicate identical parts in all the figures.

Referring to Figs. 1 and 2, A represents an ordinary T-rail of the usual or any suitable construction, of which *a* is the vertical web, *b* the double flange or foot, and *c* the head or tread piece. Embracing each side of two abutting rails at the joint is a rolled-steel fish-plate B, having a footpiece *d* fitting snugly upon the top sides of the foot-flanges *b* and extending outward beyond the same with lower inturned ends *e*, whose upper sides are beveled, as seen at *f*, the angles of said bevels, of the bevels of the tops of the foot-flanges, and the bevels on the under sides of the head of the rail being all the same. Fitted in between the bottom extensions of the footpieces *e* and the bottom of the foot of the rail and extending the entire length of the footpieces of the fish-plates is a base wedge-plate C, whose upper surface is corrugated or channeled longitudinally, as seen at *g*, for the double purpose of carrying off moisture and reducing the frictional contact between the top of the base-plate and the under side of the foot of the rail. One edge of the base-plate has an upwardly-projecting flange *h*, which bears against the edge of the footpiece of the rail, as seen in Fig. 1, or instead of a continuous flange a series of upwardly-projecting lugs might answer the same purpose. The opposite edge of the wedge-plate C has its outer corners bent down, as seen at *i*, Figs. 2 and 3, to overlap and engage the ends of the footpiece *e*, thereby securely locking the base wedge-piece to the foot extensions of the fish-plates to prevent its endwise movement or disengagement therefrom, as will be readily understood. The bottom side of the wedge-piece does not extend below the bottom sides of the footpieces *e*, as seen in Fig. 1, thus permitting a level seat for the footpieces on the ties without cutting out for the wedge-piece. As seen in Fig. 1, considerable clearance is left between the vertical web of the rail and the inner sides of the fish-plates and also considerable clearance, as at *j*, between the outer edges of the footpiece *b* and the sockets in the footpieces *d e*, so that in applying the ordinary clamping-bolts D, which extend through the fish-plates and the vertical web of the rail, a very tight and wedging union can be effected between all the parts to bind them securely together, and in case of wear or corrosion the same may be readily taken up by tightening up the bolts D. Ordinary spikes *k* are driven through slots *l* in the edges of the footpieces *d e* and into the ties E to securely lock the fish-plates and their footpieces to the track.

In the application of my joint I first apply the base wedge-plate C and then the left-hand fish-plate of Fig. 1—that is to say, the one adjacent to the flange *h* of the wedge-plate—and drive it toward the rail as tightly as possible. I then apply the opposite fish-

plate and its footpieces and drive it inward toward the rails and then apply the bolts D and tighten up their nuts and finally drive the spikes *k*, thus forming a very strong and rigid joint for the meeting ends of the rails, which is cheap in construction and easy of application.

In Fig. 4 I have shown the application of my invention for street-railway rails having grooved treads and in which the web is considerably wider than in railway-rails, and under this construction a double row of clamping-bolts is employed, and the fish-plates are preferably corrugated inward at about their middle, as seen at *m*, to come in contact with the vertical web and form additional bearings for the fish-plates when the same are tightened up.

Having thus fully described my invention, I claim—

1. In railway-rail joints, the combination of the abutting ends of the rails, a base wedge-plate fitted to the under sides of said abutting ends of the rails, said base wedge-plate being beveled on its under side and thinned gradually toward its edges, fish-plates applied to each side of the abutting rails with their upper edges bearing against the under side of the tread of the rail and having footpieces of the same length as the fish-plate and base wedge-piece, said footpieces bearing on the upper side of the foot of the rail and extended around the outer edge thereof beneath the base wedge-plate and having their upper sides beveled to conform to the bevel of the wedge-plate, and clamping-bolts passed through said fish-plates and rails for uniting the parts, substantially as described.

2. In railway-rail joints, the combination of the abutting ends of the rails, a fish-plate applied to each side thereof with its upper edge bearing on the under side of the tread of the rail and having a footpiece bearing on the upper side of the foot of the rail and extended around the outer edge thereof to the under side with a beveled upper side, at its inner end, a base wedge-plate fitted to the under side of the foot of the rail with an upward flange at one side and having beveled under sides engaging the beveled sides of the under parts of the footpieces, and clamping-bolts passed through said fish-plates and rails for uniting the parts, substantially as described.

3. In railway-rail joints, the combination of the abutting ends of the rails, a fish-plate applied to each side thereof with its upper edge bearing on the under side of the tread of the rail and having a footpiece bearing on the upper side of the foot of the rail and extended around the outer edge thereof to the under side with a beveled upper side at its inner end, a base wedge-plate fitted to the under side of the foot of the rail with downturned corners to engage the lower side of the footpiece and having beveled under sides engaging the beveled sides of the under parts of the footpieces, and clamping-bolts passed through said fish-plates and rails for uniting the parts, substantially as described.

4. In railway-rail joints, the combination of the abutting ends of the rails, a fish-plate applied to each side thereof with its upper edge bearing on the under side of the tread of the rail and having a footpiece bearing on the upper side of the foot of the rail and extended around the outer edge thereof to the under side with a beveled upper side at its inner end, a base wedge-plate fitted to the under side of the foot of the rail with an upward flange at one side and with downturned corners at the opposite side to engage the lower side of the footpiece and having beveled under sides engaging the beveled sides of the under parts of the footpieces, and clamping-bolts passed through said fish-plates and rails for uniting the parts, substantially as described.

5. In railway-rail joints, the combination of the abutting ends of the rails, a base wedge-plate fitted to the under sides of said abutting ends of the rails, said base wedge-plate being beveled on its under side and thinned gradually toward its edges, fish-plates applied to each side of the abutting rails with their upper edges beveled and bearing against the beveled under side of the tread of the rail and having footpieces of the same length as the fish-plates and base wedge-piece, said footpieces bearing on the upper side of the foot of the rail and extended around the outer edge thereof beneath the base wedge-plate and having their upper sides beveled to conform to the bevel of the wedge-plate all of said bevels having the same angle, and clamping-bolts passed through said fish-plates and rails for uniting the parts, substantially as described.

FRANK C. ANDERSON.

Witnesses:
EDWARD PECK,
GUS HAMPSON.

2153 & 2154 In the United States Circuit Court for the Eastern Division of the Eastern District of Illinois.

No. 29294.

THE RAILROAD SUPPLY CO.
vs.
THE HART STEEL COMPANY and GUILFORD S. WOOD.

In the United States Circuit Court for the Eastern Division of the Northern District of Ohio.

No. 7668.

THE RAILROAD SUPPLY CO.
vs.
THE ELYRIE IRON AND STEEL COMPANY.

"Complainant's Exhibit No. 175, Bell Process Patent."
2/28/1911.

E. B. VILKINS,
Notary Public.

E. H. BELL.

PROCESS OF MANUFACTURING TIE PLATES.

APPLICATION FILED AUG. 26, 1908.

938,109.

Patented Oct. 26, 1909.

3 SHEETS—SHEET 1.

Fig. 1.

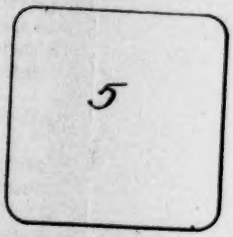


Fig. 2.

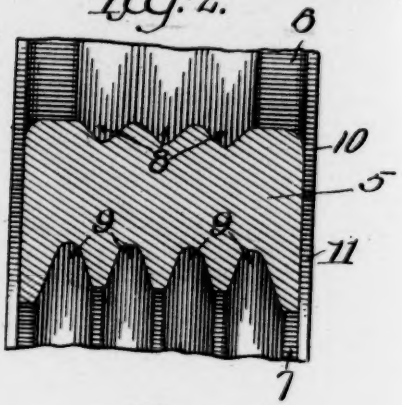


Fig. 3.

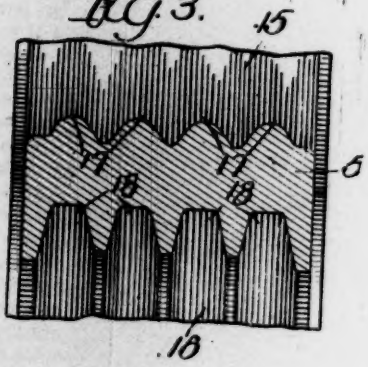
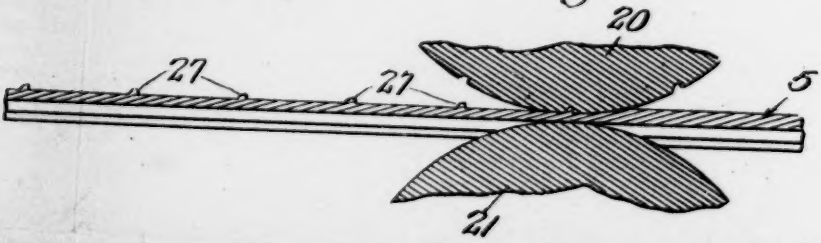


Fig. 4.

Fig. 6.

Fig. 5.

Fig. 7.



Witnesses:
F. N. Alfreds
G. M. Campbell

Inventor:
Edwin H. Bell
by Poole - Brown
Attys

E. H. BELL.

PROCESS OF MANUFACTURING TIE PLATES.

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938,109.

Patented Oct. 26, 1909.

3 SHEETS—SHEET 2.

Fig. 8.

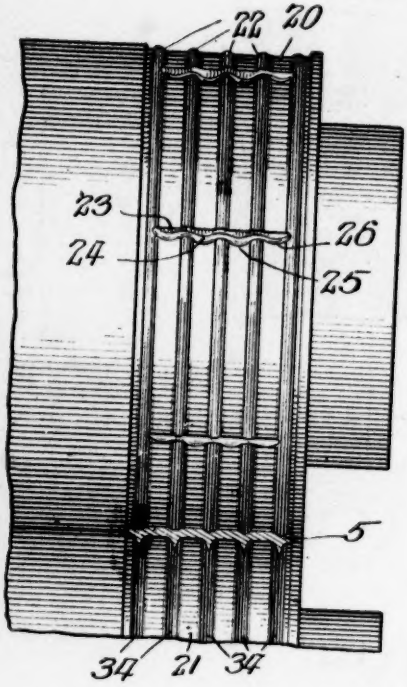


Fig. 9.

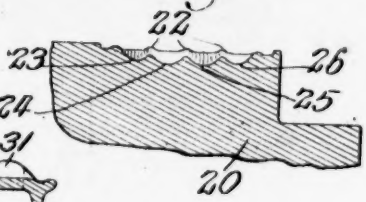


Fig. 10.

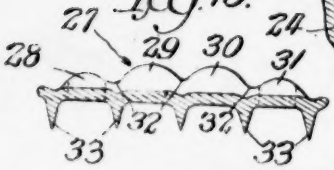


Fig. 11.

Witnesses:
F. N. Oliveto
H. M. Campbell

Inventor:
Edwin H. Bell
by Poole & Brown
Attys

E. H. BELL.

PROCESS OF MANUFACTURING TIE PLATES.

APPLICATION FILED AUG. 26, 1908.

938,109.

Patented Oct. 26, 1909.

3 SHEETS—SHEET 3.

Fig. 12.

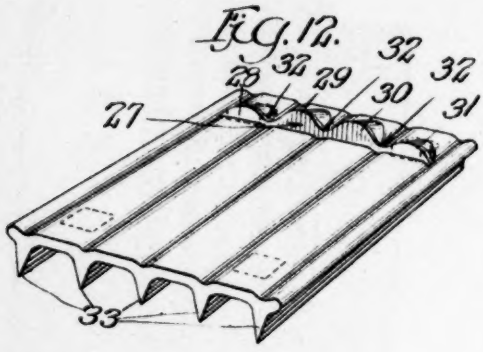
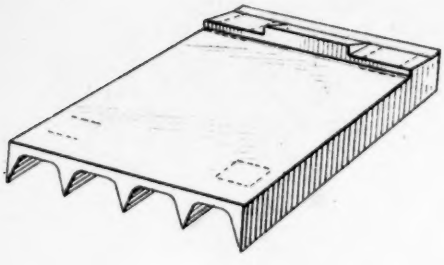


Fig. 13.



Witnesses:
F. L. Ffield
H. M. Campbell

Inventor:
Edwin H. Bell
by Poole & Morse
Attys

UNITED STATES PATENT OFFICE.

EDWIN H. BELL, OF CHICAGO, ILLINOIS.

PROCESS OF MANUFACTURING TIE-PLATES.

938,109. Specification of Letters Patent. Patented Oct. 26, 1909.

Application filed August 26, 1908. Serial No. 450,290.

To all whom it may concern:

Be it known that I, EDWIN H. BELL, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Processes of Manufacturing Tie-Plates; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in the process of manufacturing railway tie-plates of rolled steel and of that kind in which the tie-plate is provided on its upper surface with a transverse rib forming a rail-abutting shoulder.

My invention consists in the matters hereinafter described and pointed out in the appended claims.

My improved process may be described in general terms as consisting in the steps of passing a bar of metal successively between pairs of rolls, one of which is grooved to form flanges on the lower surface of the plate, thereby step-by-step converting the bar into a continuous blank having longitudinal flanges on one surface, and then passing the blank between a pair of rolls, one of which completes the formation of the longitudinal flanges while the other is provided with transverse grooves spaced apart distances corresponding with the desired length of the tie-plate, thereby displacing the metal of the tie-plate bar longitudinally to form said rib, said grooves being of different depths at different parts, whereby the metal in each rib is displaced longitudinally thereof to make parts of said rib of unequal height and finally cutting the continuous blank into sections to form the individual tie-plates.

My invention may be more readily understood by reference to the accompanying drawings illustrating the several steps constituting my novel process, in which drawings,—

Figure 1 is an end view of a billet of metal. Fig. 2 is a view in elevation of the adjacent parts of the peripheries of a pair of rolls between which the billet is first passed. Fig. 3 is a view similar to Fig. 2 showing a pair of rolls between which the billet is subsequently passed. Fig. 4 is a sectional view of the billet after having passed between several pairs of rolls. Fig. 5 is a cross-sectional view of the billet at a later period of its treatment. Fig. 6 is a sectional view of the billet prior to being passed through the last pair of rolls. Fig. 7 is a longitudinal sectional view of the blank into which the billet has been converted, showing the adjacent peripheries of the last pair of rolls, which form the shoulders on the blank. Fig. 8 is a view in elevation of the last pair of rolls, which form the shoulders on the blank, the blank being shown in transverse cross-section. Fig. 9 is a fragmentary cross-section of the upper roll illustrated in Fig. 7, showing the recesses by means of which the rounded projections are formed on the rib. Fig. 10 is an end elevation of the completed tie-plate. Fig. 11 is an end elevation of a completed tie-plate of somewhat different form. Fig. 12 is a perspective view of the form of tie-plate shown in Fig. 10. Fig. 13 is a perspective view of the form of tie-plate shown in Fig. 11.

As shown in the said drawings, Fig. 1 shows the cross-sectional form of a metal billet 5 which is to be converted by my improved process into tie-plates. 6 and 7 designate a pair of rolls between which the billet is passed, the roll 6 having three ribs 8, 8, 8, on its periphery while the roll 7 has four ribs 9, 9, 9, 9, on its periphery. The coöperating ribs on the rolls serve to impart to the billet a cross-sectional form such as is shown in Fig. 2. Said rolls 6 and 7 are provided with side flanges 10 and 11, respectively, which operate to prevent the billet from spreading laterally as the same passes through or between the rolls. A second pair of rolls 15 and 16 is employed to impart to the billet 5 a cross-sectional form, such as is shown in Fig. 3, the roll 15 having the four grooves 17, 17, 17, 17 on its periphery while the roll 16 has the four ribs 18, 18, 18, 18 on its periphery, the grooves on the said roll 15 being arranged oppositely of the ribs on the roll 16 in such a manner that the metal displaced by the said ribs is pressed into the grooves of the roll 15.

In Figs. 4, 5 and 6, the billet 5 is shown

as it appears in cross-section after having passed between succeeding pairs of rollers, each subsequent pair being arranged nearer together, in order that the billet will be gradually flattened and the peripheries of the rolls in the successive pairs are of such shape as to gradually impart to the billet longitudinal grooves on one surface and longitudinal alining flanges on its other surface, the said flanges being in line with the said grooves. The successive pairs of rolls between which the billet has passed in being converted into the cross-sectional form shown in Fig. 6, form longitudinal raised portions between the grooves on the upper surface of the plate, such raised portions being formed to enable the metal to be longitudinally displaced in the subsequent steps by which the ribs are formed. The final form is imparted to the billet 5 by means of the rolls 20 and 21, illustrated in Figs. 7 and 8 of the drawings. The upper one of the said rolls, designated by the reference number 20, is provided upon its periphery with longitudinally arranged ribs 22, 22 which are adapted to displace the metal of the plate to form longitudinal depressions or grooves in the upper face of the bed plate. For forming the transverse rib upon each of the said tie-plates transverse grooves are provided in the periphery of the upper roll 20, located at longitudinal distances apart equal to the length of a finished plate. Said grooves each consist of concave recesses 23, 24, 25 and 26 (Fig. 9) which are connected with each other by shallower parts of the grooves between them. The recesses 24 and 25, located one on each side of the central longitudinal line of the plate, are of greater depth than the recesses 23 and 26 which are adjacent to the side margins of the plate. The grooves so made, form on the plate a continuous transverse rib 27, Figs. 10 and 12, having rounded projections 28, 29, 30 and 31, the projections 28 and 31 which are adjacent to the side margins of the plate and formed by the recesses 23 and 26 being of less height than the projections 29 and 30, formed by the recesses 24 and 25 of the said grooves, and all of the said projections being separated by depressions or notches 32, 32, formed by the shallower parts of the transverse groove in the roll. The metal which forms said transverse rib, as a whole, is obtained in the rolling operation by displacement endwise of the metal of the plate, while the metal to form the higher projections 29 and 30 of the rib is displaced laterally of the plate or endwise of the groove in the roller, the shallower connecting parts of the said groove, between the concave recesses 23, 24, 25 and 26, permitting such displacement of the metal of the rib longitudinally thereof. In other words, in the rolling operation, sufficient metal is displaced endwise of the plate to form the rib as a whole while the additional quantity of metal required to form the higher rounded projections 29 and 30 is derived by lateral displacement of the metal from the parts of the rib having the lower projections 28 and 31 and at which the metal is depressed between the projections. The longitudinal alining flanges 33, 33 upon the bottom surface of the tie-plate are given a V-form in cross-sectional shape, by means of longitudinally arranged grooves 34, 34 in the periphery of the lower roll 21, said grooves 34, 34 being in line with the ribs 22, 22 upon the upper roll. After the billet has been passed between the last named pair of rolls it is cut transversely adjacent each transverse rib so that the said rib is located adjacent to one end of the plate. The said tie-plate when completed is shown in Fig. 12.

In Fig. 13 is shown a completed tie-plate of a different form from that first described, the process of manufacture of which is the same as hereinbefore set forth. The main difference between the two plates consists in the form of the transverse rib which, in the latter case, is continuous, the high and low portions thereof having straight top edges parallel with the body of the plate, instead of being curved or rounded, as in the former case. The lower surfaces of the plates are the same in both cases, but in the latter case the top surface of the tie-plate is flat instead of being longitudinally grooved as in the former case.

I claim as my invention:—

1. The process of manufacturing a tie-plate blank having a continuous transverse rib across its upper surface, the height of the rib varying at different points, said process consisting in first rolling a billet of metal into a continuous strip having longitudinal flanges on its bottom surface, and then rolling the strip so as to displace the metal on the top surface of the plate in advance of the rib portion longitudinally to form a continuous transverse rib extending across the rib portion, and to also displace the metal of said transverse rib in the direction of its length to make different parts of said rib of unequal heights.

2. The process of manufacturing a tie-plate blank having a continuous transverse rib across its upper surface, the height of the rib varying at different points of its length, said process consisting in first rolling a billet of metal into a continuous strip having longitudinal grooves on its top surface and longitudinal flanges on its bottom surface in line with the grooves, and then rolling the strip so as to displace the metal on the top surface of the plate in advance of the rib portion longitudinally to form a con-

ransverse rib extending across the on and having projections intermee longitudinal grooves, and to also the metal of said transverse rib in tion of its length to make said pro- of unequal heights.

timony, that I claim the foregoing nvention I affix my signature in the presence of witnesses, this 24th day of August A. D. 1908.

EDWIN H. BELL.

Witnesses:
C. H. SAGE,
F. M. YOUNG,
W. L. HALL.

Certificate of Clerk.

THERN DISTRICT OF ILLINOIS,
Eastern Division, ss:

T. C. MacMillan, Clerk of the District Court of the United es for the Northern District of Illinois, do hereby certify the re and foregoing to be a true and complete Transcript of the pro- lings had of record in the United States Circuit Court for the thern District of Illinois, Seventh Judicial Circuit made in ac- lance with Præcipe filed in the cause entitled The Railroad Sup- Company, Complainant vs. The Hart Steel Company and Guil- d S. Wood, Defendants, as the same appear from the original ords and Files thereof now remaining in my custody and control. n Testimony Whereof, I have hereunto set my hand and affixed seal of Court, at my office, in the City of Chicago, in said Dis- t, this Sixth day of January, 1912.

T. C. MACMILLAN, *Clerk,*
[SEAL.] By JOHN H. R. JAMAR,
Deputy Clerk.

68 *Citation and Service.*

Citation.

NITED STATES OF AMERICA, *ss:*

he President of the United States to The Hart Steel Company and to Guilford S. Wood, a resident of Chicago, in the State of Illinois, Greeting:

You, and each of you are hereby cited and admonished to be and ppear at a United States Circuit Court of Appeals for the Seventh ircuit to be holden at the City of Chicago, within thirty (30) days om the date hereof, pursuant to an Order allowing an appeal ntered and filed in the Clerk's office of the Circuit Court of the nited States for the Eastern Division of the Northern District of llinois, wherein The Railroad Supply Company is the appellant, nd you are the appellees, to show cause, if there be any, why the ecree rendered against the said appellant, has in its said Petition or appeal mentioned it should not be credited and why speedy ustice should not be done to the parties in that behalf.

Witness the Honorable C. C. Kohlsaat, Judge of the Circuit Court f the United States, this 28th day of December, in the year of our ord one thousand nine hundred and eleven (A. D. 1911).

KOHLSAAT,
United States Circuit Judge.

Service of the foregoing Citation is hereby accepted at Chica Illinois, this 28th day of December, 1911, on behalf of the appell

FRANK F. REED,
Solicitor and of Counsel for The Hart Steel Company and Guilford S. Wood.

Filed December 28, 1911. —— ——, Clerk.

(Endorsed:) Citation. Filed Dec. 29, 1911. John H. R. Jam Clerk.

2169 & 2170 United States Circuit Court of Appeals for t Seventh Circuit.

I, Edward M. Holloway, Clerk of the United States Circuit Co of Appeals for the Seventh Circuit, do hereby certify that the fo going printed pages numbered from 1 to 2168, inclusive, contain true copy of the printed record, printed under my supervision a filed February 20, 1912, on which this cause was argued, heard a determined in the case of The Railroad Supply Company vs. T Hart Steel Company and Guilford S. Wood, No. 1886, Octob Term, 1911, as the same remains upon the files and records of t United States Circuit Court of Appeals, for the Seventh Circuit.

In testimony whereof I hereunto subscribe my name and affix t seal of said United States Circuit Court of Appeals for the Seven Circuit, at the City of Chicago, this twenty-eighth day of Janua A. D. 1915.

[Seal United States Circuit Court of Appeals, Seventh Circui

EDWARD M. HOLLOWAY,
Clerk of the United States Circuit Court of Appeals for the Seventh Circuit.

2171 At a regular term of the United States Circuit Court of A peals for the Seventh Circuit begun and held in the Unit States Court room in the City of Chicago in said Seventh Circ on the third day of October, 1911, of the October Term in t year of our Lord one thousand nine hundred and eleven and our Independence the one hundred and thirty-sixth year.

And afterwards, to-wit: On the fifteenth day of January, 191 in the October Term last aforesaid, came the appellant by its cou sel, Mr. Taylor E. Brown, Mr. C. C. Linthicum and Mr. C. Claren Poole, and filed in the office of the Clerk of this Court their appe ance, which appearance is in the words and figures following, to-w

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nited States Circuit Court of Appeals for the Seventh Circuit, Oct. Term, 1911.

No. 1886.

THE RAILROAD SUPPLY COMPANY
vs.
HART STEEL COMPANY and GUILFORD S. WOOD.

The Clerk will enter my appearance as counsel for the Appellant.

TAYLOR E. BROWN.
C. C. LINTHICUM.
C. CLARENCE POOLE.

Endorsed: Filed Jan. 15, 1912. Edward M. Holloway, Clerk.

t a regular term of the United States Circuit Court of Appeals for the Seventh Circuit begun and held in the United States Court room in the City of Chicago in said Seventh Circuit on the first day of October, 1912, of the October Term in the year of our Lord one thousand nine hundred and twelve and of our Independence the one hundred and thirty-seventh year.

172 At a regular term of the United States Circuit Court of Appeals for the Seventh Circuit, begun and held at the United States Court room, in the City of Chicago in said Seventh Circuit on the seventh day of October, 1913, of the October Term in the year of our Lord one thousand nine hundred and thirteen and of our Independence the one hundred and thirty-eighth year.

And afterwards, to-wit: On the first day of October, 1914, in the October Term last aforesaid, there was filed in the office of the Clerk of this Court a Motion to Affirm Decree, which Motion is in the words and figures following, to-wit:

2173 In the United States Circuit Court of Appeals for the Seventh Circuit, October Term, A. D. 1913.

No. 1886.

THE RAILROAD SUPPLY COMPANY, Appellant,
vs.
THE HART STEEL COMPANY and GUILFORD S. WOOD, Appellees.

To Taylor E. Brown, Charles E. Mehlope, and Charles C. Linthicum, Solicitors and of Counsel for Appellant:

Please take notice, that on Tuesday, the 6th day of October, A. D. 1914, at the hour of 10 o'clock A. M., or as soon thereafter as counsel can be heard, we shall present to the Honorable Judges of

OSE IN CENTER

the United States Circuit Court of Appeals for the Seventh Ci
in the court room usually occupied by said court at Chicago,
nois, a motion for the affirmance of the decree in the above en
suit, dismissing the bill of complaint therein for want of eq
and shall ask the order of said court granting the said motio
setting down the same for hearing and argument in confor
with the rules thereof. Copies of said motion and the gro
thereof, and the evidence in support of same and of the bri
support thereof, are herewith delivered, with the exception o
record of said Circuit Court of Appeals of the Sixth Circuit, i
suit of The Railroad Supply Company v. The Elyria Iron &
Company referred to in said motion and in the affidavit of F
F. Reed in support thereof. Copies of said record and the exh
therein are in your possession. The said copy of the
2174 record referred to in said affidavit of Frank F. Reed i
tained in his possession, subject to your examination at
sonable times, and will be presented with said motion, at which
time and place you may appear, if you see fit.

Dated, Chicago, Illinois, September 25, A. D. 1914.

FRANK F. REED AND
EDWARD S. ROGERS,
Solicitors and of Counsel for Appelle

Received a copy of the above notice and of the documents s
fied therein, this 26th day of September, A. D. 1914.

____ ____,
Solicitors and of Counsel for Appella

In the United States Circuit Court of Appeals for the Sev
Circuit, October Term, A. D. 1913.

No. 1886.

THE RAILROAD SUPPLY COMPANY, Appellant,
vs.
THE HART STEEL COMPANY and GUILFORD S. WOOD, Appelle

And now come the said appellees, The Hart Steel Company
Guilford S. Wood, and move the court in the above entitled sui
an affirmance of the decree of the United States Circuit Court
the Northern District of Illinois, Eastern Division, dismissing
said bill of complaint for want of equity, basing said motion u
the following grounds:

(1) That the said suit and the issues therein have bee
2175 and are as to the said parties thereto, and each and al
them, res judicata, by reason of the decision of the Un
States Circuit Court of Appeals for the Sixth Circuit in the
ceeding recently therein finally determined and adjudicated, whe
The Railroad Supply Company was appellant and The Elyria
& Steel Company was appellee and wherein the parties respecti

COPY BOUND

are in privity with the parties herein and the subject matter, issues and evidence identical.

(2) For the reason that this suit and proceedings and the issues and proceedings therein have become and are finally and completely adjudicated by reason of the decision and decree of the United States Circuit Court of Appeals for the Sixth Circuit, entered on the 7th day of April, A. D. 1914, and since and now in full force and effect, wholly unmodified and not appealed from wherein the parties are in privity with the parties herein and the issues and evidence identical.

(3) For the reason that each and all of the issues in this suit have been fully and finally adjudicated and determined by the United States Circuit Court of Appeals for the Sixth Circuit by its decree entered in the suit recently pending in said court, wherein The Railroad Supply Company, appellant herein, was appellant, and The Elyria Iron & Steel Company was appellee, and in which the said Elyria Iron & Steel Company was in privity to and with the Hart Steel Company and Guilford S. Wood, in and by which said decision and decree of the United States Circuit Court of Appeals for the Sixth Circuit, all matters in controversy herein *was* finally determined and adjudicated.

(4) For the reason that all matters at issue and in controversy in this proceeding have been fully and finally determined by the United States Circuit Court of Appeals for the Sixth Circuit,
2176 in its decree entered on the 7th day of April, A. D. 1914, in the suit of The Railroad Supply Company, appellant, against Elyria Iron & Steel Company, appellee, in which said suit and proceeding the said The Railroad Supply Company, appellant, was The Railroad Supply Company, appellant herein, and The Elyria Iron & Steel Company, appellee, was in privity with the Hart Steel Company and Guilford S. Wood, appellees herein, and in which said suit and proceedings in said Circuit Court of Appeals for the Sixth Circuit, the pleadings, issues, evidence, exhibits and arguments are identical with the pleadings, issues, evidence, exhibits and arguments herein.

Said motion is based upon a certified copy of the decree of said Circuit Court of Appeals of the Sixth Circuit in said suit, wherein The Railroad Supply Company was appellant and the Elyria Iron & Steel Company was appellee, affirming the order of the District Court for the Northern District of Ohio, Eastern Division, dismissing the bill of complaint therein for want of equity, and of the opinion of said Circuit Court of Appeals filed therewith, which said decree is dated April 7, 1914, and the order and decree of said United States Circuit Court of Appeals of the Sixth Circuit in said last named suit and proceeding, dated June 30, 1914, denying the petition for rehearing filed therein; (2) The record in this proceeding, particular parts of which are specifically designated and attached hereto; (3) A certified copy, under the seal of the Circuit Court of Appeals of the Sixth Circuit, of a portion of the record thereof from the deposition of Henry S. Hawley identical with a portion of the deposition of said Hawley on pages 69 and 70 of the

record herein, herewith specifically designated in connection wi
this motion; (4) The affidavit of Frank F. Reed, solicitor for a
pellees; (5) A certified copy of the decree of the United Stat
District Court for the Northern District, Eastern Division,
2177 said suit of The Railroad Supply — v. The Elyria Iron & Ste
Company, dated March 4, 1912, dismissing the bill of com
plaint and of the order of said last named court allowing the filin
of the mandate in said suit from the Circuit Court of Appeals fo
the Sixth Circuit affirming the said last named decree; (5) A cop
of the record of said suit in the United States Circuit Court of Ap
peals for the Sixth Circuit, wherein said The Railroad Supply Com
pany was appellant and The Elyria Iron & Steel Company was ap
pellee with the filing stamp of the Clerk of Court thereon.

Wherefore, said appellees ask the order and decree of this cour
affirming the order and decree of said Circuit Court of the United
States for the Northern District of Illinois, Eastern Division, dis
missing said bill of complaint for want of equity.

Dated, September 22nd, A. D. 1914.

FRANK F. REED AND
EDWARD S. ROGERS,
Solicitors for Appellees.
FREDERICK P. FISH,
Of Counsel for Appellees.

United States Circuit Court of Appeals for the Sixth Circuit.

No. 2322.

THE RAILROAD SUPPLY COMPANY
vs.
THE ELYRIA IRON & STEEL COMPANY.

Appeal from the District Court of the United States for the Northern District of Ohio.

This cause came on to be heard on the transcript of the record from the District Court of the United States for the Northern District of Ohio, and was argued by counsel.

2178 On consideration whereof, it is now here ordered, adjudged and decreed by this court, that the decree of the said District Court, in this cause be and the same is hereby affirmed with costs. April 7th, 1914.

United States Circuit Court of Appeals for the Sixth Circuit.

No. 2322.

THE RAILROAD SUPPLY COMPANY
vs.
THE ELYRIA IRON & STEEL COMPANY.

The petition for rehearing filed in this cause is hereby denied. June 30th, 1914.

COPY BOUND

United States Circuit Court of Appeals for the Sixth Circuit.

I, Frank O. Loveland, Clerk of the United States Circuit Court of Appeals for the Sixth Circuit, do hereby certify that the foregoing is a true and correct copy of decree and order denying petition for rehearing in the case of The Railroad Supply Co. v. The Elyria Iron & Steel Co., No. 2322, as the same remains upon the files and records of said United States Circuit Court of Appeals for the Sixth Circuit, and of the whole thereof.

In testimony whereof, I have hereunto subscribed my name, and affixed the seal of said court, at the City of Cincinnati, Ohio, this 7th day of July, A. D. 1914.

[Seal United States Circuit Court of Appeals, Sixth Circuit.]

FRANK O. LOVELAND,
Clerk of the United States Circuit Court of Appeals for the Sixth Circuit.

(Endorsed:) Filed Apr. 7-1914. Frank O. Loveland, Clerk.)

1179 United States Circuit Court of Appeals for the Sixth Circuit.

No. 2322.

THE RAILROAD SUPPLY COMPANY
vs.
THE ELYRIA IRON & STEEL COMPANY.

Appeal from the United States District Court for the Northern District of Ohio, Eastern Division.

Submitted January 12, 1914.
Decided April 7, 1914.

Before Warrington and Denison, Circuit Judges, and Sater, District Judge.

SATER, *District Judge:*

The plaintiff is the owner of the three Wolhaupter patents numbered 538,809, 691,332 and 721,644, issued May 7, 1895, January 14, 1902, and February 24, 1903, respectively. The evidence before us is said to be the same as that on which the case was heard not only in the District Court but previously by Judge Kohlsaat, in Railroad Supply Co. v. Hart Steel Co., 193 Fed. Rep., 418. The trial court, as the result of an independent study, concurred in the conclusion reached in such reported case and dismissed the bill. The case stands for decision on appeal.

The plaintiff charges that the defendant, by its manufacture of certain tie-plates and its sale of the same through a selling agent, The Hart Steel Company, to the Atchison, Topeka & Santa Fe Railroad Company, infringed claim 8 of the plaintiff's first patent, claims 1,

2 and 3 of its second patent, and claims 7 and 9 of its third patent. The respective claims so alleged to be infringed are as follows:

"8. A railway tie-plate formed on the under side with de
2180 vices more or less sharpened adapted to penetrate and engage the tie, and on its upper side with a series of flanges on which the rail rests, substantially as described."

"1. A railway tie-plate provided on its upper side with one or more flanges on which the rail may rest or by which it is directly sustained, and on the under side with one or more tie-engaging flanges extending parallel with the upper flanges and directly beneath the latter, substantially as described."

Claim 2 is the same as claim 1, excepting it specifies by insertion after the word "latter" that the lower flanges are "sharpened to permit them to readily enter the tie."

Claim 3 is made different from claim 2 by adding before the words "substantially as described" the further element: "And on the upper side with an additional flange or flanges extending above the plane of the rail sustaining flanges and adapted to receive the lateral thrust of the rail."

"7. A tie-plate provided in its rail supporting surface with transverse grooves or channels, and at one margin of said supporting surface with a transverse rail abutting shoulder."

Excepting the limiting phrase, "reaching to the edge of the plate," added after the words "grooves or channels," claim 9 is the same as claim 7.

In support of its defense of non-infringement, the defendant avers (1) that the state of the art and of tie-plate manufacturing on the respective dates on which the three letters patent were issued was such that each and all of them are void for want of novelty or invention; (2) that if, however, any patentable invention is disclosed in any one or more of the letters patent, the claims must be limited to the specific devices therein set forth, and can not be so broadened as to include the defendant's tie-plate; and (3) that there is no patentable combination shown in the specifications and claims of any of the letters patent in that the different elements or parts
2181 which are claimed to be in combination are all old individually and collectively and are mere aggregations, having no correlative or modified functions or action upon each other or any joint contributive action in producing any new result, either originally or in Wolhaupter's devices.

A cross section or end view of the tie plate covered by the first of the patents in suit and drawings of the tie plates delineated and described in the second and third of such patents respectively are successively shown as follows:

(See Record, opposite page 486, red ink outline.)

Wolhaupter's Device, First Patent.

(See Fig. 1, Exhibit B to bill of complaint; Rec. page 7 after page 16.)

Wolhaupter's Device, Second Patent.

The form of plaintiff's commercial plate may be varied by in-
asing the number of top surface grooves.
(See Fig. 2, Exhibit C, bill of complaint, eighth page, after Rec.
ge 16.)

Wolhaupter's Device, Third Patent.

The modified forms of the T-shaped plates appearing in the third
ent, on account of their general resemblance to the form above
own, need not be reproduced.
The first of the next following illustrations represents a form of tie
te manufactured by the plaintiff for commercial use and claimed
it to be within the terms of the patents and to be infringed; the
ond, that "made" instead of "fabricated" by the defendant:
(See Rec. p. 19, Exhibit No. 14.)

Plaintiff's Tie Plate.

82 (See Exhibit D to bill of complaint, seventeenth page after page 16 of Rec.)

Defendant's Tie Plate.

"The form of plaintiff's commercial plate may be varied by the use additional top surface grooves and rail sustaining flanges." The imary question is the validity of the patents in suit. It is not ecessarily the only question for decision, nor will the correspond-ice of defendant's device with some one or more of the claims in it conclusively settle the question of infringement. Westinghouse Boyden Power-Brake Co., 170 U. S., 537, 568, 569. In view, how-ver, of the resemblance between the tie plates last above shown and the manifest dissimilarity in appearance between the plaintiff's e plates in commercial use and those shown and described in the rawings and specifications, the construction, whether broad or nar-ow, to be placed on the patents, if valid, becomes determinative of ie rights of the litigants. The two questions are so related and so ependent on the prior state of the art that a consideration of the one ecessarily runs into that of the other. The transition from the elatively small and light-weight engines and cars which character-ed early railroading to the larger, weightier and speedier engines nd heavier, more capacious and more heavily loaded cars provoked ctivity among inventors in devising means, including railway chairs nd tie plates, to prevent the spreading of the track, due to lateral rain, and the destruction of the tie from abrading and cutting ction of the rail. Before Wolhaupter applied for the first of the atents in suit, tie plates had assumed, as regards their lower por-ions, two well-known styles or forms: (1) Those whose downward-extending ribs or flanges were adapted to enter the tie longi-183 tudinally and parallel with its grain, so as to separate but not to cut the fiber; and (2) those whose downward-projecting

devices were so disposed as to extend transversely of the grain of t fiber and in consequence to cut into and sever the same. The d tinctive character of each of the forms and the theory of which it expressive are recognized by Wolhaupter in his patent No. 530,73 issued in 1894, as well as by his predecessors, Reece and Servis, their respective patents, No. 488,662, 1892, and No. 524,868, 189 Those of the second form have with substantial uniformity employe but two shallow continuous lower ribs—excluding from consider tion those on which mere projections are used. The apparent reaso for adopting that form of construction is the relatively greater r sistance of the transverse ribs not only to the force applied to imbe them in the ties, but also, on account of their pressure throughou their entire length against the compressed or severed fibre, to the out ward or lateral thrust of the rail. With equal uniformity patentee of plates of the first form have called for more than two (i. e., a serie of) lower flanges with comparatively sharp lower edges and of greate length in comparison with both the lower ribs of those of the firs form and also the thickness of the body of the tie plate. Thei greater number and greater length are designed to increase their re sistance to the lateral pressure of the rail—such resistance being re stricted to the friction of the fiber against their sides and its com pression by their blunt ends. For his patent of 1894 and for each of those in suit Wolhaupter chose a device of the first above-men tioned form. In that of 1895 he alludes to the further well-known classification of plates (whatever direction or character their flanges may assume) with reference to their top surfaces—those having such surfaces smooth and those having flanges to receive the out-
2184 ward thrust of the rail. As his patent betrays a knowledge of variously constructed plates then on the market, he might well have further recognized and specifically named those whose upper surface is grooved or channeled. Experience taught that the lateral thrust of the rail against the outer top flange of tie plates, hav ing such, caused the under flanges engaging the tie lengthwise to compress the wood fiber, and that such compression permitted the plates to creep toward the end of the tie, thus widening the gauge and increasing the pressure and abrading action on the spike. On account of thus lengthening the depression or indentation made in the tie by the lower flanges, it was, he says, practically impossible, when the plates had once moved, to return them to their original and proper position. He therefore in such patent—the first in suit—provided a preferably truss-shaped, or, as distinguished from a flat or plain top surface, a "corrugated" or ridged plate on which to rest the rail between two upward-projecting flanges against which the rail abuts, and blunt or square-ended, regularly stepped, lower flanges, supplementary to the spikes, which lower flanges are cut on a line diagonal with the rail, are preferably made with compara tively sharp lower edges, and extend downward directly below the grooves or valleys on the top of the plate sufficiently to become rather deeply imbedded in the tie. If preferred, the plate, instead of the flanges, may be cut diagonally to the rail. The distinguishing feature of his device is not a series of relatively narrow, flat-topped, supporting surfaces suitably spaced apart, i. e., a corrugated top sur-

e for the plate as distinguished from a flat or plain top surface; in alluding to the permissible variations in construction, none which was to depart from the prime object of his invention, which the stepped flanges or lower stepped projections, he states that the flanges may be divided; that instead of flanges stepped pro- 85 jections may be used; that a square instead of a beveled plate may be employed and the under flanges alone be stepped; at but one end of the plate need be st-pped; or that flanges having e or more of their ends stepped might be applied to a flat plate or the numerous other constructions of plates then on the market. is top surface construction may be entirely omitted. Disregarding s thirteenth claim, which relates wholly to spike holes, each of his maining thirteen claims covers his lower flanges, and but four of em mention his upper flanges. The body of his plate may be anged or may assume the form shown in some prior invention, t his stepped form of lower flanges or projections must be used, e his purpose to prolong the life of the tie cannot be attained. The nguage employed in his patent precludes the substitution for them any alternative form. To locate his flanges parallel with the rail cessitates an abandonment of the "prime object" and "essential ea" of his invention, which he declared to consist in providing a ate having on its under side a series of stepped flanges or projec- ons arranged in a diagonal line with respect to the rail flange. The rpose of his peculiar form of construction is that the plate, after has by lateral pressure been longitudinally displaced, may, for e purpose of prolonging the use of the tie, be taken up and the iginal gauge restored and the spikes relieved of undue pressure by placing the plate on the tie that one of its flanges will by pressure ake a new indentation and each succeeding flange will fit into a eviously formed depression with its blunt end abutting against the eviously compressed fiber, whose power to resist the outward thrust f the rail is enhanced by the depth of the indentations produced by is necessarily somewhat lengthened flanges. He contemplated wo adjustments of the character mentioned, and, if stepped flanges be placed at both ends of the plate, additional readjustments 2186 to continue the life of the tie may be made by turning it end for end. If this last form of construction be adopted, it would seem there must necessarily be, to accomplish fully the inventor's purpose, an upward-projecting flange at each side of the plate, to receive the lateral thrust of the rail. It should be said, however, that there is no call in his eight- claim for such flanges. The prominence which he gives to the adjustable feature of his plate and the means of securing the same, as evinced by his later patent, No. 579,509, 1897, convinces us that the thought of a tie plate with other than somewhat lengthy, blunt ended, stepped flanges or projections to engage the ties parallel with the fiber, was not present when the first patent in question was issued, or when he obtained his patent No. 542,787, in 1895; and in his last two patents in suit the expressed preference for flanges of that character declared in 1894 still persisted.

The leading purpose of his second patent, which is conceded, to be an improvement upon and a carrying forward of the invention

shown in the first patent in suit, is to locate his four preferably sharp, narrow, longitudinal, tie-engaging flanges directly or substantially beneath his four narrow, preferably flat-topped, rail-sustaining flanges, whose parallel sides are perpendicular to the intervening flat-bottomed top grooves or channels, that the weight may be sustained at points where the pressure on the plate is greatest and bending thereby minimized. At each side of the top of the plate the middle is turned up to form abutting flanges to receive the thrust of the rail. The only element in his device whose omission was deemed unimportant is the punched out triangular teeth. His rail abutting flanges and lower ribs are substantially those shown in the patent to Reece, No. 494,692, 1893.

2187 The dominant thought in the patentee's mind, as disclosed by his third patent in suit was, aside from his purposed economy in the use of old rails, a T-shaped tie-plate whose principal flange shall conform somewhat closely to the shape of the upper portion of the rail out of which it is to be made, and whose top surface configuration shall be such that water, sand and other deleterious substances, such as brine dripping from cars, will drain off or away from the plate. He therefore provided downwardly sloping grooves on the top of his plate, which may run parallel with but are preferably transverse or diagonal to the tie, and longitudinal tie engaging flanges projecting from its lower surface that the motion of the train, which in passing is transverse to the plate, may be utilized in clearing the plate of any material that may find lodgment on it. His main holding flange of unusual length, on which he lays stress, is central of the plate. It is therefore made much longer than those at the edge, whose office is to force the wood of the tie inward to a firm and close contact with the central flange, prevent the lifting of the outer edges of the plate, and to exclude moisture and sand from its under surface. He suggested no substitute for this particular shaped flange, which, as he understood, had in practice been abandoned. On the contrary, he intended to restore it to use and good repute. His other lower flanges are auxiliary.

All of the flanges and grooves, both upper and lower, of the defendant's tie plate run transversely of the tie. The lower ones are sunk into the tie by the pressure of the loads passing over them and, by reason of the lateral thrust, compress the wood fiber outwardly throughout their entire length. As compared with the device shown in Wolhaupter's first patent they are not stepped or give an arched effect to support the tie-plate and do not project

2188 immediately below the bottom of the valleys of the upper grooves, but are V-shaped and extend from a flat under face at points directly or substantially beneath, but not between, the upper rail bearing flanges. The defendant's plate has an upwardly extending flange, like that of Wells, No. 203,570, 1878, and of Goldie, No. 485,030, 1892, against which the rail bears by reason of the lateral thrust. No such element is called for in any of the claims in question excepting 3, 7 and 9. It has no long, narrow sharpened flanges nor a central flange of that character, but

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ey are not necessary to insure efficiency. They extend, like those own in Wolhaupter's second patent and that of Goldie, No. 5,030, Fig. 1, from directly or substantially beneath rail bearing anges, but not to afford means for sustaining the weight "at the ints where there is the greatest pressure on the plates." The eight of the passing loads is sustained by the bottom of defendant's ate and not by its lower flanges. Were it otherwise, in the absence a central flange, its plates would probably break at the middle. he use, in connection with defendant's device, of a central flange ke that shown in Wolhaupter's third patent, or of one approximat- g it in length, is impracticable. The defendant depends wholly flanges placed well toward the outer edges of its plate to hold it position—excepting, of course, spikes, of which both avail them- lves. The use of its plate by defendant has demonstrated that it es not require a central lower flange.

The field of tie-plate invention had at the time Wolhaupter en- ed it been so assid-ously cultivated as to offer many suggestions and impose many limitations upon him. The great usefulness tie-plates to so important an industry as that of railroading has pparently induced great, if not excessive, liberality in awarding patents for even slight advances in the prior art. This ap- 189 pears by a comparison, for instance, of Goldie's patent No. 610,179, 1898, with Wolhaupter's patent of 1902, applica- ons for both of which were pending at the same time. If the laintiff's patents are valid, they are narrow and entitled to but a mited range of equivalents, whether considered separately or as onjointly used. Invention in tie-plates having been sought by so any minds, it is not wonderful that they were developed in many ifferent and independent forms, all original, and yet all having a omewhat general resemblance to each other. No one inventor pre- ding all the rest hit upon something which underlaid and in- luded all that they produced, and thus acquired a monopoly and ubjected them to tribute. The advance in the art was gradual and roceeded step by step so that no one acquired an exclusive mo- opoly, and therefore each patentee acquiring a valid patent became ntitled only to his own specific form of device. Railway Co. v. ayles, 97 U. S., 554, 556, 557. The extent to which Wolhaupter as indebted to his predecessors in the art will appear from the dis- losures made by a few of the many patents in evidence. In all f his devices in question he sought to combine, with strength, light- ess of weight and economy in production; but the same intent, ometimes affirmatively expressed and sometimes not noted because bvious, is manifested by others whose patents antedate his. The se of an upward-extending flange on one or both sides of tie-plates o restrain the rail and receive its lateral thrust was so common rior to 1895 that a citation of earlier patents to show such element s unnecessary. The use of grooves or channels on the upper sur- face of his plate to serve as a receptacle for sand, grit and other hurtful substances, and to facilitate their removal and the evapora- tion of moisture had been expressly mentioned in the patents of

Wells, No. 203,570, 1878, and Dockstader, No. 462,3
2190 1891, and are seen transversely of the rail in that of Wils
No. 522,867, 1894. Dunham's device, patent No. 469,3
1892, performs the same service, and in addition, by reason of
spaces beneath the plate, facilitates the evaporation of moisture t
may get between the plate and the tie. As the grooves in the W
patent are parallel with the rail and in the line of the suct
caused by the passing trains, they ought, it would seem, to be m
effective in freeing the plate or chair of foreign substances than t
grooves transverse to the rail shown in Wolhaupter's first and s
ond patents. Dunham, among others, preceded Wolhaupter in t
use of a "corrugated" or ridged plate of a truss nature, placed par
lel with the tie, and alluded to the fact that a corrugated plate
chair in a groove or recess in the tie had been proposed—probab
referring to the Ashcroft patent No. 388,240, 1888. His plate do
not have sharpened lower flanges to enter the tie, or a flat topp
projection extending above the concave surfaces to receive the ra
but the lower contacting portions of his plate must necessarily
some extent be depressed into the tie, and, if the top surface of t
plate devised by Dunham (Fig. 4) and Wolhaupter respectively
made flat, which each of them says is permissible as regards his ow
device, their plates do not substantially differ save in the degr
of bluntness and the length of their lower flanges. The assistan
in sustaining the weight put upon the plate and the exclusion
moisture from beneath it, attributed by Wolhaupter to the slopin
or truss nature of the approaching sides of the lower flanges in hi
first patent, were also secured by the earlier devices of Churchward
No. 508,086, 1893, Worthington, No. 506,963, 1893, Holmes, No
514,465 and 514,466, 1894, and Gabel, No. 530,175, 1894. Blun
or square-ended lower flanges engaging the tie lengthwis
2191 and necessarily compressing the wood fiber as the latera
pressure of the rail forces them toward the end of the ti
were not original with Wolhaupter, but are found in the two earl
patents of Servis, Nos. 249,407, 1881, and 294,816, 1884, of Holmes
Nos. 495,807, 1893, and 514,465, 1894, the patent of Worthington
and also of Reece, No. 494,692, 1893. Excepting that of Servis
(No. 249,407, Figs. 3 and 4), all of the last named patents show
as does Wolhaupter's, the lower edges of the flanges to be somewhat
sharpened. The location of the lower tie-engaging flanges immedi-
ately or substantially beneath the shoulders or flanges sustaining
the rail, which is the primary thought embodied in Wolhaupter's
second patent in suit, is found in the patent of Goldie, No. 485,030,
1892, and, if there be but one upper rail supporting flange or sur-
face, as claims 1, 2 and 3 permit, in those of Worthington, and of
Servis, No. 524,868, 1894. Sellers, by his patent No. 684,466 1901,
preceded Wolhaupter in the thought expressed in the third patent
in suit, of manufacturing tie-plates from old rails and in the use of
a long, central holding, lower flange and a grooved top surface.
Wolhaupter flanked his central holding lower flange with two shorter
side flanges, but Wilson had previously done the same thing. Sellers'
grooves, like those in the Wilson patent, run parallel with the tie;

ereas those in the Wells run parallel with the rail and those of
lhaupter may be located either parallel with or transversely of it.
The production of either of defendant's devices or of that of com-
inant in commercial use necessitates a complete reorganization
the Wolhaupter devices, whether they be considered separately or
jointly. It is clear that if the patents and claims in question are
valid they must necessarily be so narrowly construed as to
92 relieve the defendant from the charge of infringement. But
we prefer to rest our conclusion on other grounds.
The plaintiff rightfully contends that Claim 8 is so broad as to
brace any tie-plate having on its under side more or less sharp-
ed tie-penetrating and engaging devices and on its upper side a
ies of flanges on which the rail may rest. No limitation by the
wings or the specific form of description can be imported into
without making it identical with some one or more of the other
ims. It was intended and granted as a monopoly upon the broad
neric idea of which the form shown in the drawings and descrip-
n was a species. Wolhaupter endeavored to cover a field of in-
ntion far wider than he was entitled to occupy, and the claim must
held void because it is broader than the real invention. Edison v.
nerican Mutoscope Co., 114 Fed. Rep., 926, 934, C. C. A., 2;
tional Enameling & Stamping Co. v. New England Enameling
., 151 Fed. Rep., 19, 23, C. C. A., 2. By like reasoning, each and
ery of the other claims involved must also be held invalid.
In view of the prior state of the art, which will not be further
nsidered except to illustrate our views, no device constructed ac-
rding to any of the claims in question involves invention. Wells'
tent calls for two projecting lateral flanges to restrain and receive
e thrust of the rail and three rail-sustaining bearings or top
nges located in the same horizontal plane. On each side of the
ntral flange is a groove to lighten the structure without impairing
strength and to care for sand and grit. Directly below the cen-
l rib or flange is a square-bottomed rib to prevent longitudinal and
teral displacement. He does not provide for spike holes; neither
es Claim 8 call for them. His patent does not suggest that his
lower rib may be more or less sharpened; but so old a patent
93 as that of Hudson, No. 142,020, 1873, taught that a V-shaped
or other suitably shaped flange might be used instead of a
uare-bottomed one, and those of Gould, No. 280,030, 1883, Goldie,
o. 485,030, Worthington and Holmes, No. 495,807, that the use
two or more sharpened lower flanges was a well known expedient.
laintiff's commercial plates show a reduction to two or more, as
nvenience suggests, of the multiplicity of top grooves disclosed
the Wolhaupter patents and their top surfaces are thus assimilated
that of Wells. In such commercial plates the plaintiff also re-
uces to two the multiplicity of lower flanges shown in Wolhaupter's
atent in question and places them transversely of instead of parallel
ith the tie. Neither the plaintiff nor Wolhaupter deemed such
eduction as to grooves or flanges or the change in the course or
rm of both from a position parallel to the fiber to one transverse
f the same to be without the terms of the patent. If a reduction

in the number of flanges and a change in their form does not i volve invention (and we think it does not) and is but an authoriz application of the rule of equivalents, then to increase the numb of flanges (in the Wells patent, for instance) and modify the for must also fall within the same rule; but this makes the Wells pate anticipatory not only of the first but of all three of Wolhaupter devices as claimed in this case. The fact that Wells' device spa two or more ties and is a railway chair does not preclude consider tion of it as anticipatory. Sectioned or reduced in length so as span a single tie, as does that of Goldie, it assumes the form of a ti plate. Railway chairs are a species of railway plates or track faste ings and possess the essentials of a tie-plate in that they maintain th alignment of the rails and the gauge of the track and are so close allied to tie-plates that both inventors and the patent offi
2194 have applied the name of the one to the other, as appea from the patent of Goldie, No. 426,530, 1890, and Parson No. 465,492, 1891.

Reece and Holmes in their respective patents, Nos. 494,692 an 495,807, 1893, each wished to provide a series of stops, or abutment or flanges on the upper surface of their respective devices to recei the outward bearing of the foot flange of the rail. Wolhaupte carried this same idea into his second patent. Wells had employe a lower flange extending from a flat under surface and directly be neath an upper rail bearing flange located between grooves or va leys. A series of rail-bearing flanges extending above the adjoinin top surface grooves or depressions are found in Wolhaupter's fir patent in suit. Such a modification of any one of the devices show in the last four named patents as would make it conform to th device claimed in the second patent in suit would not involve th exercise of the creative faculty.

The Hart patent, No. 696,964, 1902, provides for lower flange parallel with the fiber of the tie and for grooves on the upper sur face reaching from the middle of the plate to its outer edges parall with the rail. This is one of the forms permitted by the third Wo haupter patent. The only difference between the two is that Hart patent shows four lower flanges instead of three, his outer flange being longer than those centrally located. Figures 10 and 11 i Wolhaupter's patent No. 691,037, 1902, both show a series of upp surface grooves. Figure 11 further shows that one long centr lower flange is deemed by him a modification of the two lower flange shown in figure 5. There can be no originality, in view of th prior art, in the use by Wolhaupter of a multiplicity of lower flange as compared with the patent of Sellers, nor an avoidance o
2195 the rule of equivalents by his use of three flanges instead o the four found in the Hart patent. In view of the Goldi patent, No. 610,179, 1898, which has two lateral lower flange (Fig. 1) (but may have a third at the center of the plate) and a to surface groove, all of which grooves and flanges run parallel wit the tie, the recognition by plaintiff and Wolhaupter that a varia tion in the direction given the grooves and flanges and in the num ber of each falls legitimately within the rule of equivalents, plac

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ıtents of both Goldie and Sellers, and especially that of Sellers, e anticipatory class, and robs of patentability Wolhaupter's device as herein claimed. The use of the long lower central e, as we have heretofore seen, was anticipated by both Sellers Vilson.

ıer questions discussed need not be considered. In view of the usion reached, the trial court must be affirmed, and it is so ed.

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[SEAL.]

FRANK A. LOVELAND,
Clerk U. S it Court of Appeals
for the Sixth Circuit.

e United States Circuit Court of Appeals for the Seventh Circuit,
October Term, A. D. 1913.

No. 1886.

THE RAILROAD SUPPLY COMPANY, Appellant,
vs.
IE HART STEEL COMPANY and GUILFORD S. WOOD, Appellees.

support of the motion for affirmance of the decree of the United s Circuit Court for the Northern District of Illinois, Eastern Division, dismissing this suit for want of equity, appellees specially point out, designate and refer to the following portions of the record and brief for appellant herein:

) Beginning on page 69 of the printed record, with the words 17" and ending with the close of page 70, reading as follows:

Please state when and how you got the defendant's tie-plate ked and introduced in evidence here as 'Complainant's Exhibit 15.'

. I received this tie-plate on the 4th day of October, 1908. It rolled at the Elyria Iron — Steel Company's mills at Elyria, Ohio, r about the 2d day of October. It was one of a shipment that Elyria on or about the 2d day of October. The plate was shipped addressed to me from Cleveland, Ohio, by a representative of this pany. I had the plate photographed on its arrival, and sub- ed the plate and photograph to Poole & Brown.

ecess.

. 18. You say in answer to Q. 17 that the tie-plate 'Complain- s Exhibit No. 15' was rolled at Elyria, Ohio, and in answer to , you state that the tie-plate manufactured by the Elyria Iron & l Co. was sold by the Hart Steel Co. to the Santa Fe Railroad. e, if you know, where the sale was made.

. The sale was made in Chicago by the Hart Steel Co., repre- ed by Mr. G. S. Wood.

Stipulation.

It is hereby stipulated by and between solicitors for the respect parties that the tie-plate 'Complainant's Exhibit No. 15,' and oth like it, was manufactured by the Elyria Iron & Steel Co., at Ely Ohio, in the Northern District of Ohio, and was sold by the Hart St Co. and Guilford S. Wood, at Chicago, Ill., in the Northern Distr of Illinois, after the date of the Wolhaupter patents in suit, 'Co plainant's Exhibits Nos. 1, 2 and 3,' and prior to the date of the fili of the bill of complaint herein, and that further proof of such man facture and sale is hereby waived.

Direct examination closed.

2197 (2) The printed record herein, page 706, deposition Willis McKee, beginning with Q. 6 and terminating wi the answer to said question, reading as follows:

"Q. 6. What is the relation of the Hart Steel Company to t Elyria Iron & Steel Company, and where is it located?

A. The Hart Steel Company is the selling organization of t Elyria Iron & Steel Company, in so far as it affects the materi which they sell to railroads. The stock of the Hart Steel Compan is all owned by the Elyria Iron & Steel Company. The Hart Ste Company is a New York corporation and maintains selling offices i New York, Elyria, Atlanta, San Francisco and Chicago."

(3) Printed record, page 1326, deposition of W. S. Miller, begi ning with Q. 1, and terminating with the answer to Q. 3, to wit:

"Q. 1. Please state your name, age, residence and occupation?

A. W. S. Miller, 46 years, president of the Hart Steel Compan Elyria, Ohio.

Q. 2. And what position or office do you occupy in the Elyria Iro & Steel Company?

A. President.

Q. 3. Is it a fact as stated in the deposition of the defendant's wi ness, Willis McKee, that the Hart Steel Company is not a manufac turing concern, but is the selling agent of the Elyria Iron & Ste Company?

A. It is."

(4) Printed record, page 1349, deposition of W. S. Miller, begi ning with that portion of the record commencing with Q. 88 there and terminating with the questions and answer thereto on page 135 reading as follows, to wit:

"Q. 88. Have you produced, in response to the request made dur ing your examination yesterday and in obedience to the subpœn duces tecum that was served upon you yesterday, the contract o agreement between the Hart Steel Company and the Atchi
2198 son, Topeka and Santa Fe Railroad regarding which yo have testified?

Mr. Reed: Objected to as calling for evidence that is not rebuttal

A. I have.

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Q. 89. Please read the contract into the record or deliver it to the aminer to be marked for identification and a correct copy made the purposes of the record.

Mr. Reed: In response to this request and in response to all the errogatories that were propounded to the witness at the examina- n on December 19, 1910, relative to the connection or interest of Atchison, Topeka and Santa Fe Railroad Company in this liti- ion and all the questions which the witness under advise of coun- declined to answer and in response to and in satisfaction of the pœna duces tecum served upon the witness, counsel for defend- produces and reads from the only contract or contracts between Atchison, Topeka and Santa Fe Road and the defendants, the rt Steel Company and the Elyria Iron and Steel Company, or her of them, relating to the purchase of the 5,000 tons of tie-plates ncerning which the witness was interrogated, the following clauses ich are the only clauses in said contract or letters relating to the ject of guarantee or indemnity for the manufacture and delivery tie-plates contemplated in said contract on the part of the said rail- d company.

The contract in the form of a letter dated August 27, 1908, ad- ssed by the Atchison, Topeka and Santa Fe Railroad Company to Hart Steel Company at Chicago, Illinois, and signed by W. E. dges, General Purchasing Agent, and accepted — Hart Steel Com- ny by W. S. Miller, President.

'Fourth. If style "B" plate is ordered, you agree to protect us ainst any possible litigation from infringement of any existing pat- ts. If style "A" plate is to be furnished, we are to protect you ainst any litigation from possible infringement of patents.'

In a letter dated Chicago, September 1, 1908, addressed to Mr. E. Hodges, Gen'l P. A., the A., T. & S. F. R. R. Co., Railway Ex- change, Chicago, signed Hart Steel Company, per G. S. Wood, 99 Sales Agent, acknowledging the recepit of the contract and returning the duplicate signed, occurs the following:

'In item marked "4th" referring to the style "A" plate, we under- nd that the A., T. & S. F. Ry. Co. expect to protect us against y loss whatsoever that may be caused by reason of our rolling t particuar style of plate and should any litigation arise we will pect your attorney to handle the suit under your direction.'

The styles of plate referred to in the contract and letter are as lows: Style 'A' plate is the plate that was actually manufactured d is identical with the plate shown in 'Complainant's Exhibit No. , Photograph Defendant's Tie-plate.' Style 'A' is also shown in o views at the right-hand margin of 'Complainant's Exhibits Nos. and 20, Santa Fe Blueprint of Tie-Plate 1908,' and style 'B' is own in two views at the left-hand side of the same exhibits last ferred to.

Mr. Frank F. Reed has been retained by the Atchison, Topeka d Santa Fe Railroad Company as counsel in these cases.

By stipulation the foregoing statement of Mr. Reed is accepted full and complete answer to said questions and in lieu of the oduction of the contract."

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(See record of Sixth Circuit, pp. 35 and 36, p. 1248, p. 75
pp. 775, 776 and 777 for duplicate evidence.)

(5) Statement from brief of appellant herein on page 2 th
reading as follows:

"This device was admitted by counsel for appellee to have
fabricated in the rolling mill of the Elyria Iron & Steel Com
located in the Northern District of Ohio, as one of a lot of five
sand (5,000) tons of similar plates sold by the defendants,
Steel Company and Guilford S. Wood, to the Atchison, Tope
Santa Fe Railroad Company, the vendors and the purchaser
located and the sale and delivery being effected, within the Ea
Division of the Northern District of Illinois, after the date o
three Wolhaupter patents in suit and prior to the date o
2200 filing of the bill of complaint. (Stipulation of appe
counsel, Rec., 1347-48.)"

In the United States Circuit Court of Appeals for the Sixth Ci

THE RAILROAD SUPPLY COMPANY, Appellant,
vs.
THE ELYRIA IRON & STEEL COMPANY, Appellee.

Appeal from the United States District Court for the Nort
District of Ohio, Eastern Division.

I, the undersigned clerk of the United States Circuit Cou
Appeals for the Sixth Circuit, do hereby certify that the follo
is a true copy of a certain portion of the printed record filed
made the record of said suit, to wit:

"Q. 17. Please state when and how you got the defendant's
plate, marked and introduced in evidence here as 'Complain
Exhibit No. 15.'

A. I received this tie-plate on the 4th day of October, 1908.
was rolled at the Elyria Iron — Steel Company's mill at El
Ohio, on or about the 2d day of October. It was one of a shipm
that left Elyria on or about the 2d day of October. The plate
shipped and addressed to me from Cleveland, Ohio, by a represe
tive of this company. I had the plate photographed on its arri
and submitted the plate and photograph to Poole & Brown.

Recess.

Q. 18. You say in your answer to Q. 17 that the tie-plate 'C
plainant's Exhibit No. 15' was rolled at Elyria, Ohio, and in ans
to Q. 8 you state that the tie-plate manufactured by the Elyria I
and Steel Co. was sold by the Hart Steel Co. to the Santa
Railroad. State, if you know, where the sale was made.

A. The sale was made in Chicago by the Hart Steel Co. represen
by Mr. G. S. Wood.

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2201 *Stipulation.*

It is hereby stipulated by and between solicitors for the respective parties that the tie-plate 'Complainant's Exhibit No. 15,' and others like it, was manufactured by the Elyria Iron & Steel Co., at Elyria, Ohio, in the Northern District of Ohio, and was sold by the Hart Steel Co. and Guilford S. Wood, at Chicago, Ill., in the Northern District of Illinois, after the date of the Wolhaupter patents in suit, Complainant's Exhibits Nos. 1, 2 and 3,' and prior to the date of the filing of the bill of complaint herein, and that further proof of such manufacture and sale is hereby waived.

Direct examination closed."

In testimony whereof, I have hereunto set my hand and the official seal of said court, this 17th day of September, A. D. 1914.

[United States Circuit Court of Appeals, Sixth Circuit.]

FRANK O. LOVELAND,
Clerk of the United States Circuit Court of Appeals for the Sixth Circuit.

In the United States Circuit Court of Appeals for the Seventh Circuit, October Term, A. D. 1913.

No. 1886.

THE RAILROAD SUPPLY COMPANY, Appellant,
vs.
THE HART STEEL COMPANY and GUILFORD S. WOOD, Appellees.

STATE OF ILLINOIS,
County of Cook, ss:

Frank F. Reed, being duly sworn, deposes and states that he is the solicitor for appellees, The Hart Steel Company and Guilford
2202 S. Wood, in the above entitled suit and has conducted the defense of said suit from the date of the institution thereof. That on the 9th day of December, 1908, a suit in equity was instituted by The Railroad Supply Company against the Elyria Iron & Steel Company, in the then United States Circuit Court for the Northern District of Ohio, Eastern Division. That the suit proceeded to final decree on the 4th day of March, A. D. 1912, whereby it was ordered, adjudged and decreed that said suit be dismissed for want of equity, at complainant's costs. That thereupon an appeal was prosecuted by complainant therein to the United States Circuit Court of Appeals for the Sixth Circuit, and that on the 7th day of April, A. D. 1914, the said Circuit Court of Appeals entered a decree affirming the decree of the said United States District (then Circuit) Court for said Northern District of Ohio, Eastern Division, and sub-

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sequently, on the 30th day of June, 1914, entered a further order denying the petition for rehearing in said proceeding. Whereupon in due course a mandate was issued in said last named proceeding and filed in said United States District Court for the Northern District of Ohio, Eastern Division, copies of which decrees and orders are filed herewith.

That said Circuit Court of Appeals for the Sixth Circuit rendered an opinion in said suit, a certified copy of which is filed herewith; that the pleadings, stipulations, evidence and exhibits in said suit instituted in said Northern District of Ohio, Eastern Division, and appealed to and determined by the United States Circuit Court of Appeals for the Sixth Circuit, were in all respects, except the names of the defendants, and the opinions, title of suit and forms of decrees and orders therein, identical with or duplicates of the pleadings, stipulations, evidence and exhibits in this proceeding; and that in some instances where duplicates of the exhibits were not
2203 obtainable, the identical exhibits were by stipulation of the parties used in both cases. The only differences between the two records consists in the substitution of the name of the Elyria Iron & Steel Company as defendant for the names of Hart Steel Company and Guilford S. Wood as defendants, the use of the term "defendant" in the singular instead of in the plural as in this case; the title of the suit, the forms of the orders and decrees in said proceeding and the opinions filed therein respectively by the two courts. A copy of the opinion filed in said proceeding in the United States Circuit Court for the Northern District of Ohio, Eastern Division, is annexed to the brief for appellees in this proceeding.

Affiant files herewith and refers to a printed copy of the record showing the pleadings, proceedings and evidence in said suit in the United States Circuit Court for the Northern District of Ohio, Eastern Division, and in said Circuit Court of Appeals for the Sixth Circuit, bearing the file mark of the clerk, and used as the record in said proceeding.

FRANK F. REED.

Subscribed and sworn to before me this 22d day of September, A. D. 1914.

[Margaret Shealy, Notary Public, Cook County, Ill.]

MARGARET SHEALY,
Notary Public.

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UNITED STATES OF AMERICA,
Northern District of Ohio, Eastern Division, ss:

a stated term of the District Court of the United States within
nd for the Eastern Division of the Northern District of Ohio,
egun and held at the City of Cleveland, in said District, on the
first Tuesday in February, being the 6th day of said month,
4 in the year of our Lord one thousand nine hundred and
twelve, and of the Independence of the United States of
merica the one hundred and thirty-sixth, to wit, on Monday,
he 4th day of March, A. D. 1912.

resent: Honorable William L. Day, United States District Judge.
mong the proceedings then and there had were the following,
vit:
Order dismissing bill of complaint, entered March 4th, 1912, by
dge Day.)

No. (7668) 26. Equity.

THE RAILROAD SUPPLY COMPANY
vs.
THE ELYRIA IRON & STEEL CO.

This cause having been submitted to the court on a previous day
this term, upon the pleadings, and having been argued by counsel
the respective parties, and due deliberation having been had, the
urt finds that the equities are with the defendant.
It is, therefore, ordered, adjudged and decreed that the said bill
complaint herein be, and the same is hereby dismissed at com-
inant's costs.

HE UNITED STATES OF AMERICA, *ss:*

I, B. C. Miller, clerk of the District Court of the United States,
thin and for the Northern District of the State of Ohio, do hereby
rtify that I have compared the within and foregoing transcript
th the original order dismissing bill of complaint entered upon
e journal of the proceedings of said court in the therein entitled
use, at the term, and on the day therein named; and do further
rtify that the same is a true, full and complete transcript and copy
ereof.
Witness, my official signature and the seal of said court, at Cleve-
land, in said district, this 17th day of September, A. D. 1914,
205 and in the 139th year of the independence of the United
States of America.

[Seal of the District Court, Northern Dist. of Ohio.]

B. C. MILLER, *Clerk,*
By ANNA H. ELLIOTT,
Deputy Clerk.

Endorsed: No. 26. United States District Court, Northern District of Ohio, Eastern Division. The Railroad Supply Co. vs. The Elyria Iron & Steel Co. Certified copy of order dismissing bill of complaint.

THE UNITED STATES OF AMERICA,
Northern District of Ohio, Eastern Division, ss:

At a Stated Term of the District Court of the United States within and for the Eastern Division of the Northern District of Ohio, Begun and Held at the City of Cleveland, in said District, on the First Tuesday in April, Being the 7th Day of said Month, in the Year of Our Lord One Thousand Nine Hundred and Fourteen, and of the Independence of the United States of America the One Hundred and Thirty-eighth, to wit: On Monday, the 20th Day of July, A. D. 1914.

Present: Honorable John M. Killits, United States District Judge.

Among the proceedings then and there had were the following, to wit:

(*Order on Mandate Entered July 20th,* 1914, *by Judge Killits.*)

No. 26. Equity.

THE RAILROAD SUPPLY COMPANY
vs.
THE ELYRIA IRON & STEEL COMPANY.

This cause having been removed from this court to the United States Circuit Court of Appeals for the Sixth Circuit by the
2206 appeal of the complainant from the decree entered in this cause in this court on the 4th day of March, A. D. 1912, and the said Circuit Court of Appeals having ordered and adjudged that said decree of this court be hereby affirmed with costs and said Circuit Court of Appeals having remanded said cause to this court as appears by the mandate of the Circuit Court of Appeals, now here,

Now, on motion of the attorneys for defendant, it is ordered that the judgment of said Circuit Court of Appeals be entered as the judgment of this court, and that said defendant recover of said complainant, its costs herein expended, taxed at $—, and have execution therefor.

THE UNITED STATES OF AMERICA, *ss:*

I, B. C. Miller, clerk of the District Court of the United States, within and for the Northern District of the State of Ohio, do hereby certify that I have compared the within and foregoing transcript with the original order on mandate entered upon the journal of the proceedings of said court in the therein entitled cause, at the term, and

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the day therein named; and do further certify that the same is a
e, full and complete transcript and copy thereof.
Witness my official signature and the seal of said court, at Cleve-
d, in said district, this 17th day of September, A. D. 1914, and in
e 139th year of the Independence of the United States of America.

[Seal of the District Court, Northern Dist. of Ohio.]

B. C. MILLER, *Clerk*,
By ANNA H. ELLIOTT,
Deputy Clerk.

Endorsed: No. 26. United States District Court, Northern Dis-
ict of Ohio, Eastern Division. The Railroad Supply Company vs.
he Elyria Iron & Steel Company. Certified copy of order on man-
ate.

207 *Order.*

t a Regular Term of the United States Circuit Court of Appeals for the Seventh Circuit, Begun and Held in the United States Court Room, in the City of Chicago, in said Seventh Circuit, on the Sixth Day of October, 1914, of the October Term, in the Year of Our Lord One Thousand Nine Hundred and Fourteen, and of Our Independence the One Hundred and Thirty-ninth Year.

And afterwards, to-wit: On the sixth day of October, 1914, in the October Term last aforesaid, the following further proceedings were had and entered of record, to-wit:

Tuesday, October 6, 1914.

Present:

Hon. Francis E. Baker, Circuit Judge, presiding.
Hon. William H. Seaman, Circuit Judge.
Hon. Christian C. Kohlsaat, Circuit Judge.
Edward M. Holloway, Clerk.
John J. Bradley, Marshal.

1886.

THE RAILROAD SUPPLY COMPANY
vs.
HART STEEL COMPANY.

Appeal from the Circuit Court of the United States for the Northern District of Illinois, Eastern Division.

It is ordered by the Court that this cause be, and the same is hereby set down for hearing on November 10, 1914.

And afterwards, on the same day, to-wit: On the sixth day of October, 1914, in the October Term last aforesaid, the following further proceedings were had and entered of record, to-wit:

Tuesday October 6, 1914.

Present:

Hon. Francis E. Baker, Circuit Judge, presiding.
Hon. William H. Seaman, Circuit Judge.
Hon. Christian C. Kohlsaat, Circuit Judge.
Edward M. Holloway, Clerk.
John J. Bradley, Marshal.

Before Hon. Francis E. Baker, Circuit Judge; Hon. William H. Seaman, Circuit Judge.

2208 1886.

THE RAILROAD SUPPLY COMPANY
vs.
HART STEEL COMPANY.

Appeal from the Circuit Court of the United States for the Northern District of Illinois, Eastern Division.

Now this day come the parties by their counsel and the motion to affirm the decree of the Circuit Court in this cause now comes on to be heard on oral argument by Mr. Frank F. Reed, counsel for appellee in support of said motion and by Mr. Charles C. Linthicum, counsel for appellant in opposition thereto, and the Court having heard the same, it is now here ordered that the said motion be, and the same is hereby denied.

And afterwards, to-wit: On the sixth day of November, 1914, in the October Term last aforesaid, came the appellant by its counsel, Mr. Clarence E. Mehlhope, and filed in the office of the Clerk of this Court his appearance, which appearance is in the words and figures following, to wit:

United States Circuit Court of Appeals for the Seventh Circuit, October Term, 1914.

No. 1886.

THE RAILROAD SUPPLY CO., Appellant,
vs.
THE HART STEEL CO., et al.

The Clerk will enter my appearance as counsel for the Appellant
CLARENCE E. MEHLHOPE.

Endorsed: Filed Nov. 6, 1914. Edward M. Holloway, Clerk.

And afterwards to-wit: On the tenth day of November, 1914, in the October Term last aforesaid, the following further proceedings were had and entered of record, to-wit:—

Hearing.

Tuesday, November 10, 1914.

Court met pursuant to adjournment and was opened by proclamation of crier.

Present:

Hon. Francis E. Baker, Circuit Judge, presiding.
Hon. William H. Seaman, Circuit Judge.
Hon. Christian C. Kohlsaat, Circuit Judge.
Hon. Ferdinand A. Geiger, District Judge.
Edward M. Holloway, Clerk.
John J. Bradley, Marshal.

Before Hon. Francis E. Baker, Circuit Judge; Hon. William H. Seaman, Circuit Judge; Hon. Ferdinand A. Geiger, District Judge.

1886.

THE RAILROAD SUPPLY COMPANY
vs.
HART STEEL COMPANY et al.

Appeal from the Circuit Court of the United States for the Northern District of Illinois, Eastern Division.

Now this day come the parties by their counsel and this cause now comes on to be heard on the printed record and briefs of counsel and on oral argument by Mr. Taylor E. Brown and Mr. Charles C. Linthicum, counsel for appellant and by Mr. Frank F. Reed and Mr. Frederick P. Fish, counsel for appellees, and the Court having heard the same takes this matter under advisement.

And afterwards, to-wit: On the fifth day of January, 1915, in the October Term last aforesaid, there was filed in the office of the Clerk of this Court the Opinion of the Court in the words and figures following, to-wit:—

2210 *Opinion.*

In the United States Circuit Court of Appeals for the Seventh Circuit
October Term and Session, 1914.

No. 1886.

RAILROAD SUPPLY COMPANY, Appellant,
vs.
HART STEEL COMPANY and GUILFORD S. WOOD, Appellees.

Appeal from the District Court of the United States for the Northern District of Illinois, Eastern Division.

Before Baker and Seaman, Circuit Judges, and Geiger, District Judge.

BAKER, *Circuit Judge*, delivered the opinion of the court:

Appellant failed in its suit to hold appellees as infringers of claim 8 of patent No. 538,809, May 7, 1895, and claims 1, 2 and 3 of patent No. 691,322, January 14, 1902, and claims 7 and 9 of patent No. 721,644, February 24, 1903, all granted to B. Wolhaupter, appellant's assignor. A report of the decision in the trial court is found in 193 Fed. 418. On a record identical with that now before us the Court of Appeals of the Sixth Circuit in Railroad Supply Company v. Elyria Iron & Steel Company, 213 Fed. 789, adjudged that the claims in suit were void for lack of invention. While these decisions are entitled to, and have been given, great weight in our consideration of the case, neither of them can be allowed to control our judgment or relieve us in any degree from giving to the record a complete and independent investigation. We proceed to set forth the findings of fact and conclusions of law which lead us to hold that the claims are valid and infringed.

I. The inventions covered by the several claims in suit are susceptible of joint use in one article, a railroad tie plate, and therefore the three patents are properly brought forward in one suit. Of the three, we deem the first the most important, the others being improvements of the tie plate covered by claim 8 of the first patent. That claim reads as follows:

"8. A railway tie plate formed on the under side with de-
2211 vices more or less sharpened adapted to penetrate and engage the tie, and on its upper side with a series of flanges on which the rail rests, substantially as described."

1. At the root of the case lies the inquiry whether it is true that "Wolhaupter endeavored to cover a field of invention far wider than he was entitled to occupy, and the claim must be held void because it is broader than the real invention." This conclusion is based on the finding that "the distinguishing feature of his device is not a series of relatively narrow, flat-topped, supporting surfaces suitably spaced apart, i. e., a corrugated top surface for the plate as distin-

shed from a flat or plain top surface; for, in alluding to the per-
ssible variations in construction, none of which was to depart
m the prime object of his invention, which is the stepped flanges
lower stepped projections, he states that the flanges may be di-
ed; that instead of flanges stepped projections may be used; that
quare, instead of a beveled, plate may be employed, and the under
nges alone be stepped; that but one end of the plate need be
pped; or that flanges having one or more of their ends stepped
ght be applied to a flat plate or to the numerous other construc-
ns of plates then on the market. His top surface construction may
entirely omitted. Disregarding his thirteenth claim, which re-
tes wholly to spike holes, each of his remaining 13 claims covers his
wer flanges, and but 4 of them mention his upper flanges. The
dy of his plate may be changed, or may assume the form shown
some prior invention, but his stepped form of lower flanges or pro-
ctions must be used, else his purpose to prolong the life of the tie
nnot be attained. The language employed in his patent precludes
ne substitution for them of any alternative form. To locate his
anges parallel with the rail necessitates an abandonment of the
rime object' and 'essential idea' of his invention, which he declared
o consist in providing a plate having on its under side a series of
tepped flanges or projections arranged in a diagonal line with respect
o the rail flange."

A reading of the specification discloses very clearly, we believe,
hat instead of the patent merely describing one invention in which
he prime object or essential idea consisted in providing on the under
ide of the tie plate a series of stepped flanges or projections arranged
in a diagonal line with respect to the rail flange, another invention
was described, as distinct and separate an invention as if it had been
contained in a separate patent, and it is in relation to this
2212 additional disclosure that claim 8 and some other claims of
the patent were framed. We subjoin Fig. 1 and Fig. 2 of
the patent and under headings A and B those parts of the description
and also the statements of invention which point to the separateness
of the two subject-matters.

Fig. 1.

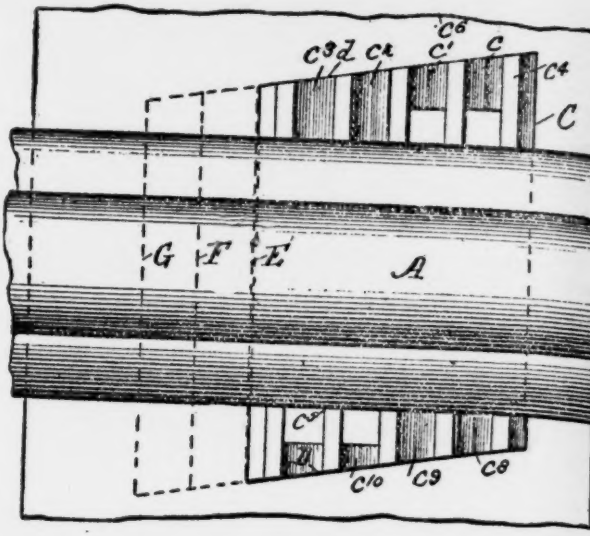
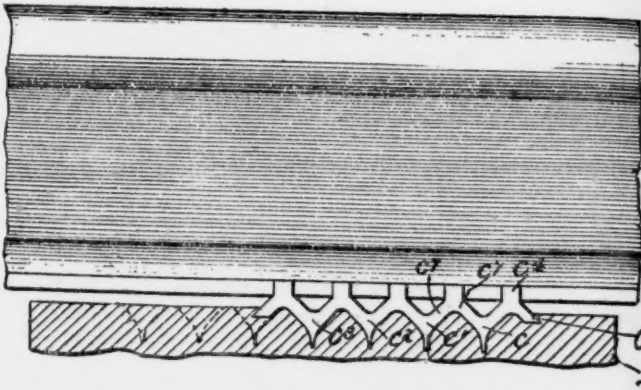


Fig. 2.



A. "In carrying out the invention A represents the track rail, B the tie, and C the tie plate. The plate is preferably, although not necessarily, formed into the shape shown more particularly 2213 in Fig. 2, that is to say, what may be termed a trussed shape so that flanges are provided on both the under side as at c^1, c^2, c^3 and top side as at c^4. On the top side a way c^5 for the rail or what may be termed the rail seat is provided. The flanges on the under side are preferably shaped with comparatively sharp edges so that they will readily enter and separate the grain of the tie. As will be seen when in position these under flanges extend parallel with the grain of the tie, the ends being substantially blunt or square and forming abutments to prevent so far as possible the plate from creeping along the tie. It will be observed that by this form of plate

ere is much less opportunity or chance of buckling than with the dinary flat plate, since each point where the rail rests upon the late is supported and -russed by metal which is more or less on edge stead of on its side, thereby forming for each resting point of the il two girders c^7 joined at the apex by the top flanges c^4 where the il rests. By the above construction also the wood between the anges c, c^1, c^2, c^3 will, because of the sloping of the approaching des of the flanges, be compressed between the flanges, thereby reatly aiding in sustaining the weight put upon the plate, and also n excluding moisture from the wood under the plate. A form of late such as I have just described is also of material advantage in hat I am enabled to make it much lighter in weight. In this con- truction of plate with the same amount of material as is ordinarily sed in tie plates a much stronger plate is obtained. Heretofore it as been a commercial necessity in order to get the price of plates here they could be sold for use on the cheaper grade of ties, to re- uce and diminish as far as possible the material and consequently he weight of the plate. The result has been that with the plate flat nd thin it has buckled when the rail pressure has been brought on t thereby damaging the tie as well as rendering the plate useless as bearing for the rail; but in my construction since the points where he rail rests are supported by metal more or less in upright position he plate is greatly strengthened without addition of weight. So lso, by a construction as above, the top of the plate where the rail s seated comprises a series of flat portions with a series of depressions etween, so that while there is abundant wearing surface between he rail and plate, there is space for sand, cinders, &c., to work out. Again, these depressions permit the draining off of water and moisture so that in cold weather the top of the plate, particu- 2214 larly the space between the rail and plate, is not covered with ice and the friction between the rail and plate thereby either essened or obviated entirely."

And it was with respect to the above quoted particularized description that the patentee made the following general statement of invention:

A. "The invention further contemplates a form of plate provided with top and under flanges which shall be extremely strong in its construction and effective in its designed use, and yet easily rolled or formed into shape as well as very light weight." And upon this general statement of invention and particularized description the patentee based not only claim 8, which by its terms is not limited to the preferred trussed shape shown in Fig. 2, but also other claims in which the trussed form and other details of construction are covered. Of these latter claims we quote 10 and 11 as illustrative:

"10. A railway tie plate the body of which is formed into a series of arches, the lower edges of said arches being provided with tie-entering and engaging devices or flanges, substantially as described.

"11. A railway tie plate the body of which is formed into a series of arches the lower edges of which are provided with tie-entering and engaging flanges, and the upper side of the plate having a series of depressions vertically above said engaging flanges, substantially as described."

B. "I will now describe the second feature of the invention, vi
the ability to adjust the plate to take up any widening of the ga
due to the lateral movement of the plate and rail. The ends of t
engaging flanges on the under side of the plate are regularly stepp
or cut on a diagonal line as compared with the rail flange. It is
course obvious that the ends of the flanges might be cut on th
diagonal line or the entire end of the plate cut in this way. In m
present drawings I have shown the latter construction, the entire en
of the plate being sheared diagonally as at D." (Then follows
particular description of the stepped flanges on the under side of th
plate, which for present purposes can be sufficiently understood fro
an examination of Fig. 1, after which the specification proceeds.

"It is obvious that the construction just described is susceptible o
many changes, and the prime object of the invention still be attained
For instance, the under flanges might be divided, or instead of flange
they might be merely projections and the plate instead o
2215 having its end beveled might be square, and the under flange
alone be stepped; or but a single end of the plate need b
stepped; or the flanges having one or more of their ends stepped
might be applied to a flat plate or to the numerous other construc
tions of plates now on the market. In all of the above named varia
tions the principle employed is the same and each would embody th
essential idea of my invention which consists in providing a plate
on its under side with a series of stepped flanges or projections, tha
is to say, flanges or projections arranged on a diagonal line with re
spect to the rail flange."

With respect to the subject-matter of stepped flanges on the under
side of the plate the inventor made the following general statement
of invention:

B. "My invention has for its object the production of a plate
which, while being provided with the top flange to receive the thrust
of the rail, is so constructed on its under side that, after it has been
moved by the lateral pressure of the rail, it, together with the rail,
can be easily moved back to the proper position to maintain the gage,
and be held in that position even more firmly than when originally
laid."

And upon this general statement of invention and particularized
description the patentee made several claims to features of the stepped
flanges on the under side of the plate. We quote claim 1 as an ex-
ample.

"1. The combination with the rail and tie of the tie plate provided
with a series of stepped tie engaging flanges or projections on the
under side, each arranged to fit into the perforation made by the
flange or projection next adjacent, whereby when the plate is shifted
transversely of the tie it is also shifted longitudinally thereof, sub-
stantially as described."

It is thus made clear, we believe, that a serious error is committed
in saying that the stepped flanges on the under side of the plate is
the prime object and essential idea of the patent. Undoubtedly such
a construction is the prime object and essential idea of one of the
two separate inventive concepts disclosed and claimed in the patent.
Both inventive concepts contemplate the production of a complete

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plate and both concepts are embodied in combination claims; but
s only with respect to the concept of stepped flanges on the under
e of the plate that the patentee makes the statement that many
nges of construction might be made without departing from the
me object of the invention, as for instance applying the stepped
flanges to a plate having a flat top.

16 Turning now to claim 8 we perceive that the subject-matter
is a railway tie plate formed on the under side with devices
re or less sharpened adapted to penetrate and engage the tie, and
its upper side with a series of flanges on which the rail rests. Ad-
ntages in having a series of flanges on the upper side of the plate
the rail to rest upon are clearly pointed out in the part of the
cification which we have quoted under the heading A. These
vantages are manifestly independent of the character of the tie-
gaging flanges on the under side of the plate. Claim 8 very
arly, we think, undertakes to stake out a monopoly of having rail-
pporting flanges on the upper side of any railway tie plate on the
der surface of which are devices of any sort adapted to penetrate
d engage the tie. The objects to be attained by the rail-supporting
nges were separate and distinct from those to be accomplished by
e stepped arrangement of the tie-engaging flanges. The mental
ncepts were different and their coming into being was in nowise
pendent upon each other. Therefore it is inadmissible, in our
dgment, to read into claim 8 that part of the specification which is
voted to the stepped arrangement of the tie-engaging flanges and
us limit the right of the inventor to hold a monopoly of the rail-
pporting flanges in a railway tie plate unless that tie plate also
nbodies the independent concept of the stepped arrangement of the
-engaging flanges.

And inasmuch as it was confessedly old in the art to have on tie
ates tie-engaging devices, that ran parallel with the grain of the tie
d also across the grain, there is nothing in the prior art or in the
tent itself that requires the tie-engaging devices of claim 8 to be
rallel with the grain of the tie or across the grain, and assuredly
thing that requires them to be the stepped tie-engaging flanges of
aim 1.

Nor is the tie plate of claim 8 to be limited to a construction in
hich the depressions between the rail-supporting flanges are verti-
lly above the tie engaging flanges, nor to a construction wherein
e body of the plate is formed into a series of arches. This is so
cause the alignment of the depressions on the upper side with the
nges on the under side is covered by claim 11, and the formation
the body of the plate into a series of arches is covered by claim 10;
d because in contemplation of law each claim of the patent must
e considered as setting forth a complete and independent invention.
Leeds & Catlin v. Victor Talking Machine Co., 213 U. S. 301;
217 Celluloid Mfg. Co. v. Zylonite Brush & Comb Co., 27 Fed.
291; Chicago Woodenware Co. v. Miller Ladder Co., 133 Fed.
11; XXth Century Heating & Ventilating Co. v. Taplin Rice-
lerkin Co., 181 Fed. 96. To construe claim 8 as being the same as
ther claim 10 or claim 11 would be to declare claim 8 void as a
uplication. Such a course should not be pursued unless it cannot

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fairly be avoided. In the present instance not only can it fair
avoided, but further the specification clearly requires a differ
tion of claim 8 from the other claims of the patent. In quotati
the patentee shows that the form portrayed in Fig. 2 and pa
larly described by reference letters was only the preferred for
preferred because, while embodying the general characteristics
the law of the structure covered by claim 8 with respect to
supporting flanges on the upper side of a plate having on its u
side any sort of tie-engaging devices, it also enabled the mak
embody at the same time the stepped arrangement of the l
flanges described and claimed in other parts of the patent.

We therefore conclude that the Patent Office was right in d
mining that there was a sufficient description and disclosure o
vention to support claim 8 as presented; and further, that clai
should be given its prima facie value unless matters outside the
ent make such a construction impossible.

2. A contention is made that the association of elements in cl
8 does not constitute a true mechanical combination, but is me
an aggregation. In Pickering v. McCullough, 104 U. S. 310 (3
the one statement of Mr. Justice Matthews that "in a patentable c
bination of old elements, all the constituents must so enter into i
that each qualifies every other," is separated from the context
taken to mean that the natural action of each element must by
action of the other elements upon it be converted into some sor
action other than its natural action, seems to have gone too far.
Patent Office has continued to grant and the patent courts have c
tinued to sustain combination claims on the theory that it is su
cient if the elements are associated in a unitary structure and th
coöperate to produce either a new mode of operation or a new re
or the old result in a modified and improved way. In Oshkosh Gr
Matting Co. v. Waite Grass Carpet Co., 207 Fed., 937, we uphe
against the defense of aggregation, in a machine for making gr

twine, claims for combinations of "means for forcing the m
2218 terial forwardly, a funnel into which the material is receiv
compression-rolls adapted to receive the material therebetwe

after said material leaves the funnel, and means, after the mater
is compressed, for wrapping a twine therearound," although it is
parent that the natural action of the feeding means could not
changed into some other sort of action by the subsequent action
the compression-rolls or by the still later action of the twine mecha
ism. In short, the action of no one of the elements could or did
anywise affect the inherent law of action of any of the other e
ments. But, because the grass twine machine was a unitary stru
ture and because all of the elements coöperated to produce an i
proved grass twine, the defense of aggregation was overruled. A
in Krell Auto Grand Piano Co. v. Story & Clark Co., 207 Fed. 94
citing Burdett-Rowntree Mfg. Co. v. Standard Plunger Elevator C
196 Fed. 43, 197 Fed. 743, and other cases, we upheld, against th
defense of aggregation, in an automatic player-piano, claims for th
combination of the controlling levers with the fall-board, althoug
no coäction between those elements was possible except throught th

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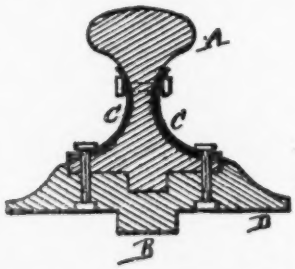
mediation of the operator. In the instant case there is a unitary structure in which all of the elements of claim 8 coöperate to produce a new tie plate with new and improved qualities. We are therefore of the opinion that, if claim 8 is to be overthrown, it must be on account of some other defense.

3. The utility of the invention is abundantly demonstrated by the instant and growing demand, amounting at the beginning of this suit to over forty million plates a year, and is further shown by appellees' move to share in this commercial success in the face of the uncertainty of vigorous and expensive litigation. This last mentioned fact might also be taken as sufficient to evince the novelty of appellant's structure, since appellees probably would not venture on the possibility of being convicted of trespass if they could have found upon the public commons what would serve their commercial purposes. And an examination of the seventy-odd patents in the record leaves no doubt that appellant produced something that in fact was new. The real question at this point in the case is whether the inventive faculty or no more than skill of the mechanic was employed in producing the new thing, for, as declared in Bates v. Coe, 98 U. S. 48, anticipation or denial of novelty of a combination claim cannot be based upon picking and choosing pieces here and there from prior patents and publications and thus showing that 2219 each of the elements was old. The real test is whether the mental concepts that are distinctly disclosed in and by the laws of the prior non-anticipatory patents and publications left no room for a new and independent mental conception in bringing into working form the new machine or product or process under investigation.

An analysis of all the prior patents we deem unnecessary. If the strongest references cannot prevail, it would be profitless to review the others. Two classes of references will be noticed, rail chairs and tie plates.

a. Patent no. 142,020, August 19, 1873, to Hudson, and patent no. 203,570, May 14, 1878, to Wells, are the strongest references of the rail chair class. Fig. 2 of the Hudson patent is as follows:



The projection from the under side of the rail chair is not a device "more or less sharpened adapted to penetrate and engage the tie"; it is a heavy rectangular rib made to fit snugly into a corresponding

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depression cut into the tie in advance. And the upper side of th
Hudson chair is not provided with "a series of flanges on which th
rail rests," for the depression in the upper surface of the chair so co
responds with the snugly fitting rib depending from the rail that th
rail throughout its breadth is seated in uniform contact with th
chair. The Hudson patent, in our judgment, furnished no light t
those concerned with the problem of producing an efficient tie plate
As wooden ties became more and more expensive and as rails an
trains and traffic became heavier and heavier, the cutting of the tie
by the action of the rail flange due to the wave motion of the trac
became a very serious matter. The shingles or flat plates of wood
with which the practical tie plate art began were soon found to b
insufficient. These were succeeded by flat plates of iron, and down
to Wolhaupter's time the best that the practical art had wa
2220 an iron tie plate having a flat upper surface and having tie
engaging projections on the under side. Physical exhibits
in this case show that these flat plates became warped or worn
through in a comparatively short time. The wearing relation be
tween the rail and tie plate is the same as between the rail and the
tie; but with rail chairs the situation is different. Rail chairs are
devices used where the ends of rails come together; they are intended
to hold the separate rails firmly together and in alignment and so give
them as far as possible the effect of being one continuous rail; they
are bolted or otherwise permanently and securely affixed to the rail;
and so, as far as cutting or grinding action between the rail and the
tie caused by the wave motion of the track is concerned, they belong
with the rail. Tie plates are intended to protect the wooden ties
from being worn and cut by the action of the flange of the T-rail due
to the wave motion of the track; they are laid upon the surface of
the ties and are attached thereto by means of tie-engaging projec-
tions; spike holes are provided in the plates through which are driven
the spikes whose heads clamp over the flange of the T-rail; and so,
as far as cutting or grinding action between the rail and the tie caused
by the wave motion of the track is concerned, they belong with the
tie. And thus, due to the wave motion of the track, water and sand
or grit would get in between the rail and the surface of the flat tie
plate and would grind and destroy the metal. This was a known
condition of the practical tie plate art; but the record does not show
that this same condition had to be met by workers in the rail chair
art, and the law of the rail chair structure would seem to exclude it;
and it was not until after Wolhaupter's disclosure that any mechanic,
expert or otherwise, claims to have discovered in the 22 year older
Hudson patent any instruction regarding the way in which to build
an efficient tie plate.

Figs. 1 and 3 of the Wells patent are as follows:

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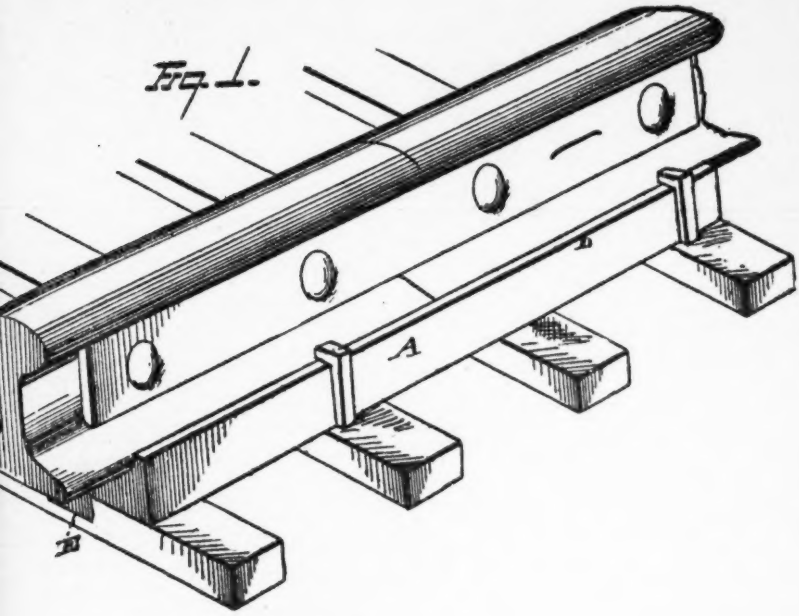

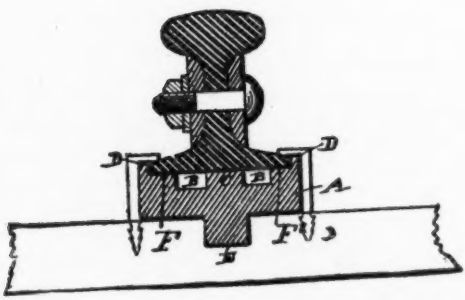

This chair, as Wells directed it to be made, extends over four ties. The depending rib E is not a device "more or less sharpened adapted to penetrate and engage the ties"; it is a rectangular projection, about one-half as broad as the head of the rail, and made to fit snugly into a prepared channel cut across the body of the tie; the channel in the tie is of such a depth as manifestly to weaken it; the purpose of the depending rib is to prevent lateral displacement of the chair and to impart increased strength and stiffness to the central portion of the chair; this strengthening function is called into play where the depending rib acts as a girder from tie to tie; and it is therefore a clear departure from the law of the structure to cut from

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Wells' chair a piece the width of a tie and then call the rib or girde
E a device in a tie plate adapted to penetrate and engage the tie. Th
rail is supported upon the ledges F. F[1] and C. These ledges resul
from the presence of the grooves B which, as the patentee says, enabl
the chair to be made much lighter than the ordinary chair and whic
also serve as receptacles for sand and grit which may enter betwee
the chair and the rail. But inasmuch as Wells's device was a rai
chair extending over four ties, a distance of about 5 feet, it seem
fairly clear to us that Wells never had in mind, and the record doe
not show that the railway chair art was ever concerned with, over
coming the emery-like grinding and cutting action upon the tie o
upon armor on the tie as that action is brought into play upon the
ties successively by the wave motion of the track. For, though
Wells's chair may not be as securely and inevitably made a part o
the rail as is the case with Hudson's chair, yet it is clear that Well
intended the law of his structure to be that the chair should be par
of the rail, just as a tie plate is a part of the tie. The sides D extend
up flush with the upper surface of the flange of the rail; the spike
shown in Fig. 3 and described in the specification are not the ordi
nary rail spikes, but are specially made of such a width as to lock the
rail into the chair; and, though this locking might not be as efficien
as the permanent bolts in the Hudson chair which was of no greate
length than the width of the tie, yet by reason of the great length
of the chair as specified by Wells, probably the locking was in fac
just as effectual and there is no doubt that Wells intended the rail t
be locked securely in the chair. If this is so, then the upper surfac
of the tie plate of claim 8 was distinctly novel in itself. But this i
not vital to the validity of the claim. The claim is for a combinatio
and it is very evident that the devices of both Hudson and Well
would have to be redesigned, reörganized and rebuilt in order to brin
into existence the combination of claim 8. That something mor
than the skill of a mechanic who was acting in the line of the teach
ing of these patents was required to produce the efficient tie plate o
claim 8 might be inferred from the great lapse of time between Hud
son and Wells and the disclosure of Wolhaupter, during which tim
the need of an efficient tie plate was recognized by many skil
2223 ful persons engaged in improving the roadbeds of railroads
but the fact is really demonstrated by the practical develop
ment of the tie plate art.

b. Prior to 1870 the tie protector was a wooden shingle or plate
From about 1870 to 1880 a simple metal plate with flat top and fla
bottom was used. Between 1880 and 1895, when Wolhaupter mad
his disclosure, a channel plate of equal thickness throughout, whic
fitted over the tie like a cap, a flat topped plate with tie-engaging de
vices on the bottom, a plate flat on the top and bottom with a shou
der on the top to resist lateral pressure of the rail, and the same so
of a plate with tie-engaging devices on the bottom, were in actual use
but never prior to Wolhaupter had the tie plate of claim 8 been pr
duced. And since then the entire development has been along th
line of improving the tie plate of claim 8. If the redesigning an
reörganization of the rail chairs of Hudson and Wells was so obviou

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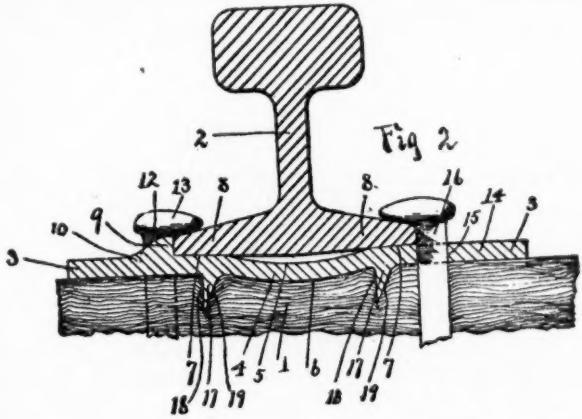
hy did not some one of the many men who were interested in the nprovement of the roadbeds of the thirteen hundred railroads of ur country bring forward this combination which has proven to be desirable?

In addition to the prior practical art some prior patents need to e noted. Fig. 2 of the Goldie patent no. 485,030, October 25, 1892, as follows:



The draftsman has indicated a space between the bottom of the rail flange and the top of the central portion of the tie plate; but this is contrary to the intention that Goldie had in mind. He 2224 points out that the under surface of the rail flange is slightly raised in the middle and that the depression in the tie plate is made to accommodate the bottom of the rail so formed, and in this way a firm and solid bearing for the rail is afforded throughout the width of the rail flange. Physical exhibits showing the result of the actual use of this tie plate demonstrate that Goldie's idea accorded with the fact, and that the rail actually bears fully upon the tie plate throughout the width of the rail flange. The manufacture of this plate, as the patentee thereof himself testified, was abandoned, and its use was entirely superseded by the Wolhaupter plate.

Patent no. 494,692, April 4, 1893, to Reece, is for a method of making railroad tie plates. At one step in the process of manufacture there are flanges at each edge which might be rail supports if they were left in the completed plate. But the next step in the manufacture cuts away these flanges at the part where the rail is seated, and the rail rests upon the flat surface of a plate of uniform thickness, except that there are two holes left in the plate by the process of cutting away the flanges. It is difficult to see how Reece, by cutting away what otherwise might be rail-supporting flanges, was instructing the ordinary mechanic how to make a tie plate having on its upper side a series of flanges on which the rail rests much less instructing him in regard to the desirability of such flanges.

Wilson's tie plate, described in patent no. 522,867, July 10, 189 is made in several pieces. One part of Wilson's tie plate, by re ganizing it in the light of Wolhaupter's disclosure, might be ma into something similar; but when the whole plate is put together Wilson instructed it to be, the rail rests upon a flat plate of unifor thickness throughout.

So far there has been found in neither the practical nor the pap prior art any tie plate which approached the idea of having rail-su porting projections upon the upper surface of a plate. Figs. 1 an 4 of the Dunham patent no. 469,386, are as follows:

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FIG. 1.

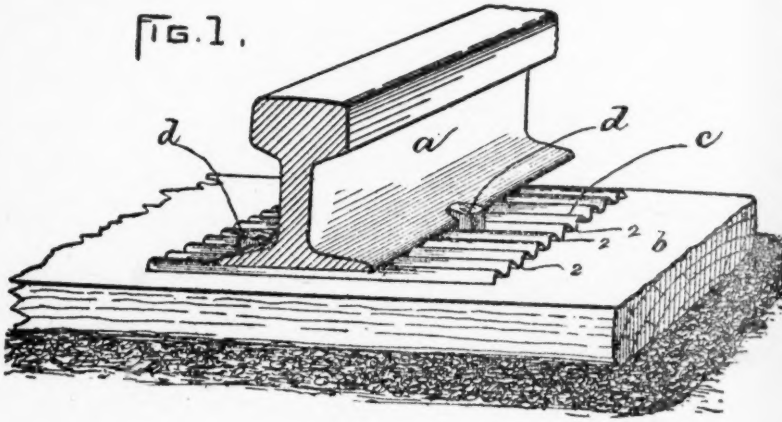

FIG. 4.

This corrugated plate is of uniform thickness throughout. Two purposes were to be served by the corrugations. First, the patentee says that a corrugated plate three-sixteenths of an inch thick will be stiffer and better adapted to resist the bending or buckling strain to which it is subjected by the weight of the rolling stock than a flat plate which is five-eighths of an inch thick. This tie plate never made any appearance in the practical art. Testimony of practical men convinces us that Dunham's three-sixteenths of an inch material would either break or flatten out under the weight to which it would have been subjected in actual use at the date of the application, and since that time the strains have greatly increased. Second, the corrugations were to afford air spaces between the bottom of the plate and the tie to obviate the decay of the wood. Regarding the bottom formation of this tie plate of uniform thickness, it is to be noted that the corrugations could not be tie-penetrating and tie-en-

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gaging devices else the air spaces would be lacking and the plate would fit tightly upon the wood as in Wolhaupter's plate. Regarding the upper surface, no suggestion with respect to the corrugations is made except that thus the plate may be made lighter and stronger.

2226 And that the character of the upper surface was not material is shown by the patentee's statement in connection with Fig. 4 that a plate with a flat upper surface corresponds fully to his invention. In our judgment nothing in this paper patent corresponds in letter or in spirit to the tie plate of claim 8.

4. The law which we believe is applicable to these facts has been frequently declared and may be briefly summarized. Invention of a combination does not lie in gathering up the elements that are employed, but consists in first conceiving that a new and desirable result may be attained by bringing about a relationship of elements which no one has before perceived and then going forth to find the things that may be utilized in the new required relationship. In an old and well developed field the apparent simplicity of a new device is often the highest evidence of inventive genius. So far as human minds are able, judges should exclude from view the disclosure of the patentee, should regard the patentee's problem as of a time antedating the application, and should therefore not too readily accept the ex post facto wisdom of the bystander. Prior art structures are to be examined in view of the purposes and laws of such structures. It is not enough that a prior art device approach very near the idea of the patent in suit; it must so clearly disclose the idea that it would be apparent to a mechanic of ordinary intelligence who was not examining the device for the purpose of discovering in it the idea of the patent; for, if he already had that idea, he would not be getting it from the prior art device, but from his own imagination or some other source. Clough v. Barker, 106 U. S., 155; Topliff v. Topliff, 145 U. S., 156; Potts v. Creager, 155 U. S., 597; Diamond Rubber Co. v. Consolidated Tire Co., 220 U. S., 428; Ryan v. Goodwin, 3 Sumner, 514; Regent Mfg. Co. v. Penn. Elec. Co., 121 Fed., 80; Faries Mfg. Co. v. Brown & Co., 121 Fed., 547; Ideal Stopper Co. v. Crown Cork & Seal Co., 131 Fed., 244; Wm. B. Scaife & Sons Co. v. Falls City Woollen Mills, 209 Fed., 210.

Another consideration is the presumptive validity of a patent. From long and continued repetition of the phrase the members of the patent bar and of the patent bench sometimes may seem to get into the condition of the man who repeats a word over and over until it fails to convey any meaning to his mind. But this presumption should be given more than formal recognition. A patent is a contract between the government on behalf of the people and the pat-

2227 tentee. The grant of a patent might have been made conclusive evidence of its validity except against suits by the government for fraud or mutual mistake in the issuance. But the fact that certain defenses are left open to the individual should not make us lose sight of the nature of the presumption that attaches to the grant. Not merely has the application been examined on behalf of all the people by experts who have access to all the prior patents and publications of the world; not only has the applicant spent his

time and invested his money in procuring the patent; but in most of the important cases the patentee and those working under him have invested very large sums in buildings and machinery and have expended other large sums and put in great energy and effort to build up, by advertising and salesmanship, a profitable business. And this is done before anyone challenges the presumptive validity of the patent. Courts therefore should not view the application as of the date of its filing and constitute themselves into a board of reviewing examiners and on nicely balanced considerations find that the Patent Office examiners were in error; but they should consider the patentee's equities in his business which has developed under the presumptive validity of the patent, should give heed to the place achieved by the patented article in the field of the practical art since the date of the patent, and should therefore decline to sustain the defense of non-invention and to strike down the patent and the business built upon it unless that defense has been established beyond a reasonable doubt. In this case we find that the appellees have not so maintained their defense.

II. Claims 1, 2 and 3 of the second patent read as follows:

"1. A railway-tie plate provided on its upper side with one or more flanges on which the rail may rest, or by which it is directly sustained and on the under side with one or more tie-engaging flanges extending parallel with the upper flanges and directly beneath the latter, substantially as described.

"2. A railway-tie plate provided on its upper side with one or more flanges on which the rail may rest and by which it is directly sustained and on the under side with one or more tie-engaging flanges extending parallel with the upper flanges and directly beneath the latter and sharpened to permit them to readily enter the tie, substantially as described.

"3. A railway-tie plate provided on its upper side with one or more flanges on which the rail may rest and by which it is directly
2228 sustained, on the underside with one or more sharpened tie-engaging flanges extending parallel with the upper flanges and directly beneath the latter, and on the upper side with an additional flange or flanges extending above the plane of the rail-sustaining flanges and adapted to receive the lateral thrust of the rail, substantially as described."

In the prior art the nearest reference is the first Wolhaupter patent, which shows a tie plate having rail-supporting and tie-engaging flanges. The claims now in question are for a specific and limited improvement of the first Wolhaupter tie plate. By limiting the construction to one wherein the tie-engaging flanges are parallel with and directly beneath the rail-supporting flanges greater strength was obtained. Nothing in the prior art anticipates this particular construction. Of course the idea may be the same as that which induces the placing of the columns on one floor of a building immediately beneath the columns on the upper floor. But the question here, as was the case with the first patent, is one of invention, whether it involved more than mechanical skill to perceive that such a general strengthening principle might be brought into the relation-

between the elements of a tie plate, and then practically to or-
ize the new structure. The prompt acceptance of this idea, the
mercial success to which this idea has contributed, and the fact
seven years elapsed after Wolhaupter had disclosed the general
bination before any of the numerous engineers interested in rail-
d construction perceived the possibilities of such a relationship,
d us to resolve any doubt that might be created by the apparent
plicity of the step, in favor of the validity of the patent.

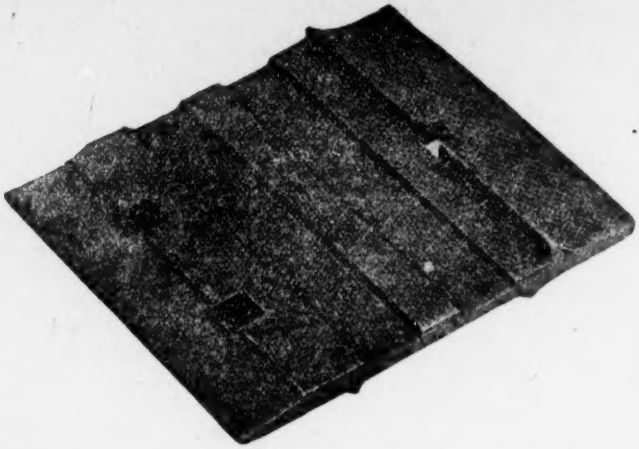
III. Claims 7 and 9 of the third patent are in these words:

"7. A tie-plate provided in its rail-supporting surface with trans-
se grooves or channels, and at one margin of said supporting-
face with a transverse rail-abutting shoulder."

"9. A tie-plate provided in its rail-supporting surface with trans-
rse grooves or channels, reaching to the edge of the plate, and at
e margin of said surface a transverse rail-abutting shoulder."

Here again is a specific and limited improvement upon the orig-
al Wolhaupter tie plate. The invention does not consist in put-
ng a rail-abutting shoulder upon a tie plate. And the concession
that rail-abutting shoulders were old in the tie plate art pre-
229 sents no obstruction to the validity of a claim in which the
rail-abutting shoulder is one of several elements. In this in-
tance, also, the question is whether invention was involved in pro-
ducing this specific and limited combination. No prior structure
f the practical or of the paper art either meets these limited claims
or suggests, out of all possible relationships of the elements, the par-
ticular relationship that is here claimed. For the reasons stated in
connection with the other patents, we are unable to find that the de-
fense of non-invention is properly sustained.

IV. In developing its commercial tie plate appellant dropped from
view many of the separate inventions embodied in other claims of
these patents; but it brought into one structure the several inven-
tions of the claims in suit. We have found that none of these
claims is nullified by the prior art or limited by anything more than
its own terms. So respecting infringement the question is whether
these claims read upon the structure put forth by the appellees. A
photographic reproduction of appellees' tie plate is as follows:



As this tie plate is substantially a copy of appellant's commercia
structure, the real inquiry is whether appellant has abandoned i
own inventions. To us it seems clear that this tie plate respond
in letter and in spirit to the terms and meaning of the claims in sui
We have no difficulty in perceiving a railway tie plate formed on th
under side with devices more or less sharpened adapted t
2230 penetrate and engage the tie and on its upper side with
series of flanges on which the rail rests. We also observe tha
the tie-engaging flanges extend parallel with and are directly be
neath the rail-supporting flanges. It is likewise obvious that ther
is the specific and limited relationship of having the rail-abuttin
shoulder at one margin of and parallel with the rail-supportin
flanges and of having both the rail-abutting flange and the rail
supporting flanges transverse to the tie.

The decree is reversed with the direction to order an accountin
on the claim of the first patent and to enter an injunction and orde
an accounting on the claims of the second and third patents.

A true Copy.

Teste:

____ ____,

Clerk of the United States Circuit Court
of Appeals for the Seventh Circuit.

And afterwards, on the same day, to-wit: On the fifth day of Jan-
uary, 1915, in the October Term last aforesaid, the following further
proceedings were had and entered of record, to-wit:—

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TUESDAY, January 5, 1915.

Court met pursuant to adjournment and was opened by proclamation of crier.

Present:

Hon. Francis E. Baker, Circuit Judge, presiding.
Hon. William H. Seaman, Circuit Judge.
Hon. Christian C. Kohlsaat, Circuit Judge.
Hon. Julian W. Mack, Circuit Judge.
Edward M. Holloway, Clerk.
John J. Bradley, Marshal.

Before:

Hon. Francis E. Baker, Circuit Judge.
Hon. William H. Seaman, Circuit Judge.
Hon. Ferdinand A. Geiger, District Judge.

1886.

RAILROAD SUPPLY COMPANY
vs.
HART STEEL COMPANY and GUILFORD S. WOOD.

Appeal from the Circuit Court of the United States for the Northern District of Illinois, Eastern Division.

2231 This cause came on to be heard on the transcript of the record from the Circuit Court of the United States for the Northern District of Illinois, Eastern Division, and was argued by counsel.

On Consideration Whereof, It is now here ordered, adjudged and decreed by this Court that the decree of the said Circuit Court in this cause be, and the same is hereby reversed with costs; and that this cause be, and the same is hereby remanded to the District Court of the United States for the Northern District of Illinois, Eastern Division, with the direction to order an accounting on the claim of the first patent and to enter an injunction and order an accounting on the claims of the second and third patents.

And afterwards, to-wit: On the twentieth day of January, 1915, in the October Term last aforesaid, there was filed in the office of the Clerk of this Court a certain Stipulation, which Stipulation is in the words and figures following, to-wit:

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In the United States Circuit Court of Appeals for the Seventh Circuit, October Term, A. D. 1913.

No. 1886.

THE RAILROAD SUPPLY COMPANY, Appellant,
vs.
THE HART STEEL COMPANY and GUILFORD S. WOOD, Appellees.

Appeal from the Circuit Court of the United States for the Northern District of Illinois, Eastern Division.

Hon. Christian C. Kohlsaat, Presiding.

It is stipulated by and between counsel for the parties in the above entitled suit that the issuance of the mandate therein shall be stayed until the further order of the Court, and that the physical exhibits in said suit (including the volume of blue print exhibits and the publication styled "Das Eisenbahn Geleise," filed on behalf of Appellees) may be withdrawn and kept in the custody of the respective counsel for said parties, subject at all times to the order and direction of the Court and to mutual inspection, and that an order
2232 may be entered to the above effect without further notice to the parties.

Dated, January 20, A. D. 1915.

TAYLOR E. BROWN,
C. C. LINTHICUM,
Solicitors for Appellant.
FRANK F. REED &
EDWARD S. ROGERS,
Solicitors for Appellees.

Endorsed: Filed Jan. 20, 1915. Edward M. Holloway, Clerk.

And afterwards, to-wit: On the twenty-first day of January, 1915, in the October Term last aforesaid, the following further proceedings were had and entered of record, to-wit:

THURSDAY, January 21, 1915.

Court met pursuant to adjournment and was opened by proclamation of crier.

Present:

Hon. Francis E. Baker, Circuit Judge, presiding.
Hon. Christian C. Kohlsaat, Circuit Judge.
Hon. George A. Carpenter, District Judge.
Edward M. Holloway, Clerk.
John J. Bradley, Marshal.

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1886.

THE RAILROAD SUPPLY COMPANY
vs.
HART STEEL COMPANY et al.

Appeal from the Circuit Court of the United States for the Northern District of Illinois, Eastern Division.

Upon the filing of a stipulation of counsel it is now here ordered that the mandate in this cause be, and the same is hereby stayed until the further order of this Court, and that the physical exhibits in this cause may be withdrawn as provided for in said stipulation.

2233 And afterwards, to-wit: On the twenty-eighth day of January, 1915, in the October Term last aforesaid, there was filed in the office of the Clerk of this Court a certain Præcipe, which said Præcipe is in the words and figures following, to-wit:

In the United States Circuit Court of Appeals for the Seventh Circuit.

1886.

RAILROAD SUPPLY COMPANY
vs.
HART STEEL COMPANY and GUILFORD S. WOOD.

Appeal from the Circuit Court of the United States for the Northern District of Illinois, Eastern Division.

To Edward M. Holloway, Clerk of the United States Circuit Court of Appeals for the Seventh Circuit.

SIR: You will please prepare immediately a transcript of the record for application for a Writ of Certiorari to the Supreme Court of the United States in the above entitled cause, to embrace one copy of each of the following documents, to-wit:

1. Appearance for appellant, filed April 15, 1912.
2. Motion to Affirm, filed October 1, 1914.
3. Order of October 6, 1914.
4. Order of October 6, 1914.
5. Appearance for appellant, filed November 6, 1914.
6. Order of November 10, 1914.
7. Opinion of the Court, filed January 5, 1915.
8. Decree entered January 5, 1915.
9. Stipulation, filed January 20, 1915.

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10. Order of January 21, 1915.
11. A copy of this Præcipe.

Chicago, Illinois, January 27, 1915.

FRANK F. REED.

Endorsed: Filed January 28, 1915. Edward M. Holloway, Clerk.

2234 United States Circuit Court of Appeals for the Seventh Circuit.

I, Edward M. Holloway, Clerk of the United States Circuit Court of Appeals for the Seventh Circuit, do hereby certify that the printed pages, numbered from 2171 to 2233, inclusive, contain a true copy of the proceedings had and papers filed, made in accordance with the Præcipe filed herein on the twenty-eighth day of January, 1915, in the case of The Railroad Supply Company vs. Hart Steel Company and Guilford S. Wood, No. 1886, October Term, 1914, as the same remains upon the files and records of the United States Circuit Court of Appeals, for the Seventh Circuit.

In testimony whereof I hereunto subscribe my name and affix the seal of said United States Circuit Court of Appeals for the Seventh Circuit, at the City of Chicago, this twenty-eighth day of January, A. D. 1915.

[Seal United States Circuit Court of Appeals, Seventh Circuit.]

EDWARD M. HOLLOWAY,
Clerk of the United States Circuit Court of Appeals for the Seventh Circuit.

2235 In the Supreme Court of the United States, October Term, A. D. 1914.

THE HART STEEL COMPANY and GUILFORD S. WOOD, Petitioners,
vs.
THE RAILROAD SUPPLY COMPANY, Respondent.

Petition for Certiorari to the Circuit Court of Appeals of the United States, Seventh Circuit.

It is stipulated by and between counsel for the respective parties in the above entitled suit that the assignments of error hereto annexed may be filed, entered and assigned of record in said proceedings.

Dated, Chicago, March 22, 1915.

FRANK F. REED &
EDWARD S. ROGERS AND
FRED P. FISH,
Solicitors and of Counsel for Petitioners.
TAYLOR E. BROWN,
CHARLES C. LINTHICUM, AND
CLARENCE E. MEHLHOPE,
Solicitors and of Counsel for Respondent.

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36 In the Supreme Court of the United States, October Term, A. D. 1914.

IE HART STEEL COMPANY and GUILFORD S. WOOD, Petitioners,
vs.
THE RAILROAD SUPPLY COMPANY, Respondent.

etition for Writ of Certiorari to the Circuit Court of Appeals of the United States for the Seventh Circuit.

Assignments of Error.

And now come the petitioners in the above entitled proceeding nd show that there is error therein and that said Circuit Court f Appeals for the Seventh Circuit committed error in its judgment nd decree therein as follows:

(*a*) In reversing said decree of the said Circuit Court of the Jnited States dismissing said suit for want of equity.

(*b*) In sustaining and holding valid the said specified claims of aid three Letters Patent, to-wit: Claim 8 of No. 538,809, claims 1, 2 and 3 of No. 691,332 and claims 7 and 9 of No. 741,644, claimed o be infringed, and each thereof.

(*c*) In refusing to hold and in not holding said claims of said Letters Patent specified, and each thereof, invalid and void for want of patentable combination between the parts thereof as claimed.

(*d*) In refusing to hold and in not holding said claims of said Letters Patent specified, and each thereof, anticipated, invalid and void for want of invention and patentable novelty.

2237 (*e*) In holding that the said tie plate device employed by defendants was an infringement of said specified claims of said Letters Patent, or any thereof.

(*f*) In not affirming the decree of the Circuit Court of the United States dismissing said suit for want of equity.

(*g*) In holding that the tie plates sold by petitioners were an infringement of and in directing an accounting for the alleged infringement of said eighth claim of said first named Letters Patent (No. 538,809).

(*h*) In holding that the tie plates sold by petitioners were an infringement of, and in directing an injunction based upon and an accounting for the alleged infringement of said specified claims in said two remaining Letters Patent (Nos. 691,332 and 721,644), and each and all thereof.

(*i*) In denying and overruling said motion of petitioners to affirm said decree of said Circuit Court on motion of petitioners upon the opinion and decree of the Circuit Court of the United States as res judicata.

(*j*) In not granting said motion of affirmance on the ground of res judicata.

(*k*) In directing a decree against petitioners for costs of said suit and proceeding.

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Wherefore, petitioners respectfully pray that the decree of s
Circuit Court of Appeals for the Seventh Circuit in said cause, a
each and every part thereof, may be reversed by this Honora
Court, and thus your petitioners will ever pray, etc.

FRANK F. REED,
EDWARD S. ROGERS, AND
FREDERICK P. FISH,
Solicitors and of Counsel for Petitioners.

FREDERICK P. FISH,
Of Counsel for Petitioners.

2238 [Endorsed:] No. 24569. In the Supreme Court of Unit
States, October Term, A. D. 1914. The Hart Steel Co
pany and Guilford S. Wood, Petitioners, vs. The Railroad Supp
Company, Respondent. Stipulation for Assignments of Erro
825.

2239 [Endorsed:] File No. 24,569. Supreme Court U. S., O
tober term, 1914. Term No. 825. The Hart Steel Co. et a
Petitioners, vs. The Railroad Supply Co. Stipulation of counsel an
assignment of errors. Filed March 24, 1915.

2240 UNITED STATES OF AMERICA, *ss:*

[Seal of the Supreme Court of the United States.]

The President of the United States of America to the Honorable th
Judges of the United States Circuit Court of Appeals for th
Seventh Circuit, Greeting:

Being informed that there is now pending before you a suit i
which The Railroad Supply Company is appellant, and The Har
Steel Company and Guilford S. Wood are appellees, which suit wa
removed into the said Circuit Court of Appeals by virtue of an ap
peal from the Circuit Court of the United States for the Northern
District of Illinois, and we, being willing for certain reasons that th
said cause and the record and proceedings therein should be certifie
by the said Circuit Court of Appeals and removed into th
2241 Supreme Court of the United States, do hereby command
you that you send without delay to the said Supreme Court
as aforesaid, the record and proceedings in said cause, so that th
said Supreme Court may act thereon as of right and according to
law ought to be done.

Witness the Honorable Edward D. White, Chief Justice of the
United States, the sixteenth day of March, in the year of our Lord
one thousand nine hundred and fifteen.

JAMES D. MAHER,
Clerk of the Supreme Court of the United States.

Return to Writ.

UNITED STATES OF AMERICA,
Seventh Circuit, ss:

In pursuance *to* the command of the within writ of certiorari and in pursuance of the stipulation of the parties, a full, true and complete copy of which is hereto attached, I hereby certify that the transcript of record furnished with the application for a writ of certiorari in the case of The Railroad Supply Company, Appellant, vs. The Hart Steel Company and Guilford S. Wood, Appellees, No. 1886, is a full, true and complete transcript with all the pleadings, proceedings and record entries in said cause as mentioned in the certificates thereto.

In testimony whereof, I hereunto subscribe my name and affix the seal of the United States Circuit Court of Appeals for the Seventh Circuit, at office in the City of Chicago, Illinois, this twenty-third day of March, A. D. 1915.

[Seal United States Circuit Court of Appeals, Seventh Circuit.]

EDWARD M. HOLLOWAY,
Clerk of the United States Circuit Court of Appeals for the Seventh Circuit.

2242 [Endorsed:] File No. 24,569. Supreme Court of the United States, No. 825, October Term, 1914. The Hart Steel Company et al. vs. The Railroad Supply Company. Writ of Certiorari. Filed Mar. 23, 1915. Edward M. Holloway, Clerk.

2243 In the United States Circuit Court of Appeals, Seventh Circuit, October Term, A. D. 1914.

No. 1886.

THE RAILROAD SUPPLY COMPANY, Appellant,
vs.
THE HART STEEL COMPANY and GUILFORD S. WOOD, Appellees.

It is stipulated by and between counsel for the respective parties in the above entitled suit that the transcript of the record therein, heretofore certified to the Supreme Court of the United States by the clerk of said court as the record therein in connection with the petition for a writ of certiorari filed by the appellees and now on file in said Supreme Court, is the record in said suit, and may be used as the record therein in the proceedings upon and hearing of

said petition for certiorari heretofore filed in the said Supreme Court of the United States, allowed by, and now pending in said Supreme Court.

Dated, Chicago, March 22, 1915.

TAYLOR E. BROWN,
CHAS. C. LINTHICUM, AND
CLARENCE E. MELHOPE,
Solicitors for Appellant and Respondent.
FRANK F. REED &
EDWARD S. ROGERS AND
FRED P. FISH,
Solicitors for Appellees and Petitioners.

Endorsed: Filed Mar. 23, 1915. Edward M. Holloway, Clerk.

[Endorsed:] 825/24,569.

2244 [Endorsed:] File No. 24,569. Supreme Court U. S., October term, 1914. Term No. 825. The Hart Steel Company et al., Petitioners, vs. The Railroad Supply Company. Writ of certiorari and return. Filed March 27, 1915.